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POPULAR MECHANICS MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

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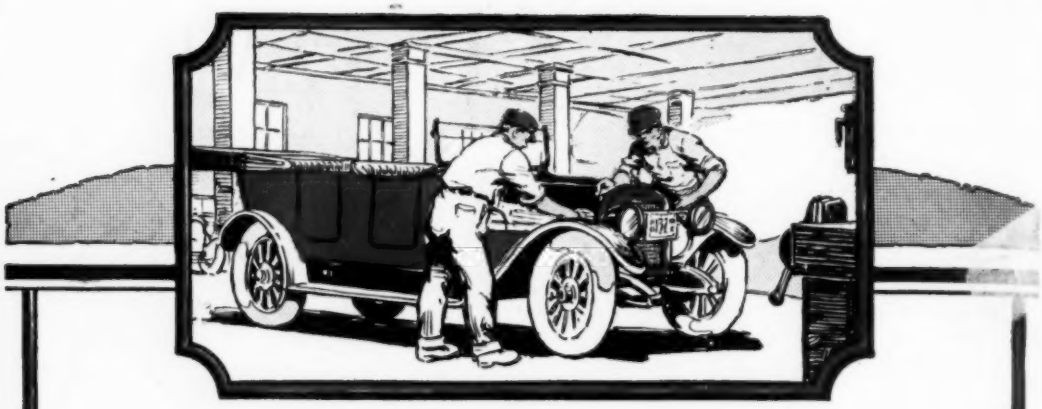

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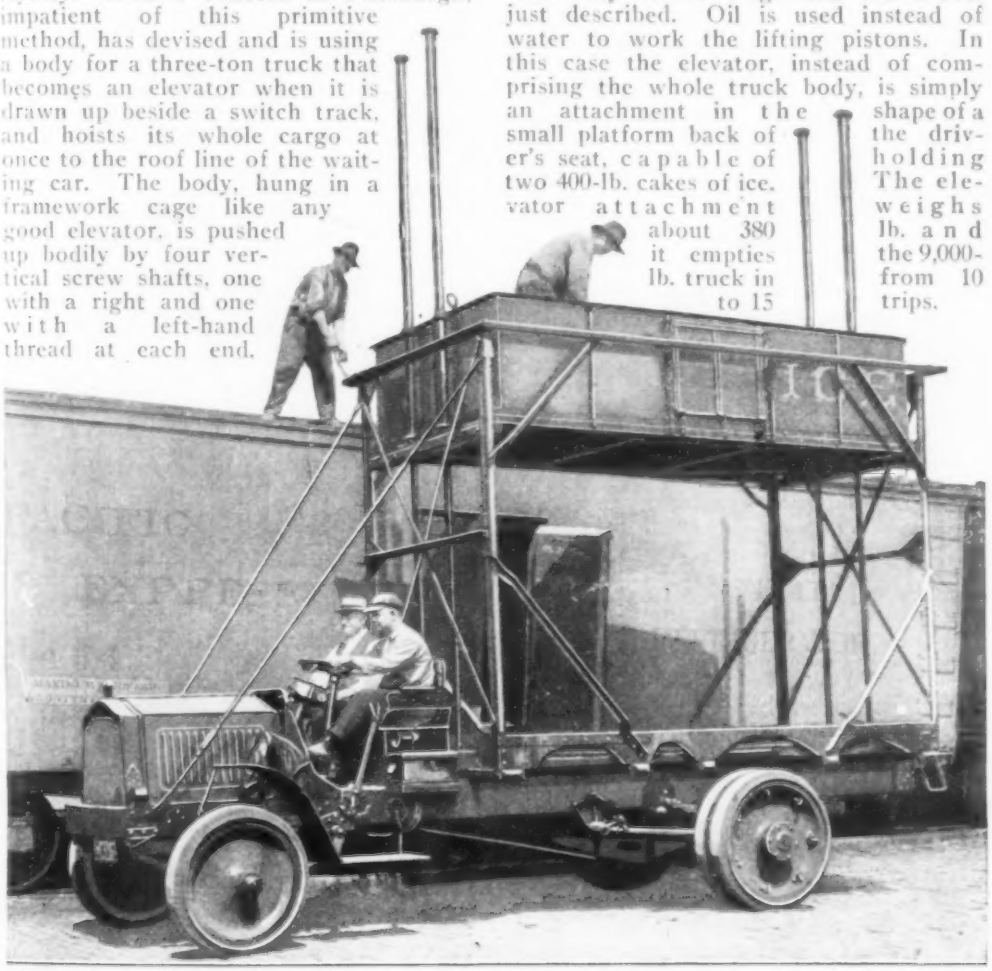
Vol. 32 DECEMBER, 1919 No. 6

Truck with Elevator Body Loads Ice Cars

MOTOR trucks that rise up in front and spill their contents out the rear are common sights, though they never lose their novelty to the passers-by. Useful as this contrivance has proved, however, it is helpless before the task of dumping ice into the top of a refrigerator car. This work, indeed, is usually done by hand, slowly and laboriously. Now a concern in Pittsburgh, impatient of this primitive method, has devised and is using a body for a three-ton truck that becomes an elevator when it is drawn up beside a switch track, and hoists its whole cargo at once to the roof line of the waiting car. The body, hung in a framework cage like any good elevator, is pushed up bodily by four vertical screw shafts, one with a right and one with a left-hand thread at each end. The truck engine revolves these elevating rods under the driver's control. The blocks of ice are simply slid out of a side door in the body into the roof door of the car, an expeditious and economical performance.

The principle of the hydraulic elevator also has been applied to motor trucks for loading ice into refrigerator cars, in the same city where originated the model just described. Oil is used instead of water to work the lifting pistons. In this case the elevator, instead of comprising the whole truck body, is simply an attachment in the shape of a small platform back of the driver's seat, capable of holding two 400-lb. cakes of ice. The elevator attachment weighs about 380 lb. and the truck empties 9,000-lb. from 10 to 15 trips.



Motor Truck with Elevator Body, for Loading Ice into the Top of a Refrigerator Car: The Body is Hoisted by Revolving Four Vertical Screw Shafts, Using the Engine of the Truck

GERM-FREE DRINKING FOUNTAIN "BENDS" WATER AT AN ANGLE

Not every drinking fountain is germ-free; many are sanitary only in appearance. In the Art Institute of Chicago, however, is placed a fountain that is as hygienic as it is interesting. It is formed of a hollow ring supported upon eight small feed pipes. Around the ring, above the junction with each pipe, are eight outlet holes. When a thirsty visitor to the museum presses the button which controls the flow, eight small jets of water dart from the holes and meet above the center of the ring. Here they unite to produce one vertical column of water. Water contaminated by the lips of the drinker falls back harmlessly through the center of the ring.

Ultra-Sanitary Drinking Fountain, Seen as It is Installed at the Left, and in Operation at the Right: Eight Tiny Streams Converge to Form the Central Fountain, and the Waste Water Falls Back Harmlessly through the Center of the Ring without Touching the Outlet

WORLD FREED FROM YELLOW FEVER BY SANITATION

Science has at last vanquished yellow fever, it is believed, after a long and tedious struggle, in which sanitation was the chief weapon employed by the victors. The story of what is declared to have been the last stand of the dreaded malady, in Guayaquil, Ecuador, is told in a recent report from South America. Experts from the United States who fought an epidemic there finally brought it under subjection, and no cases have been reported in the city for about three months.

SEAPLANES TO LOCATE FISH FOR FISHERMEN

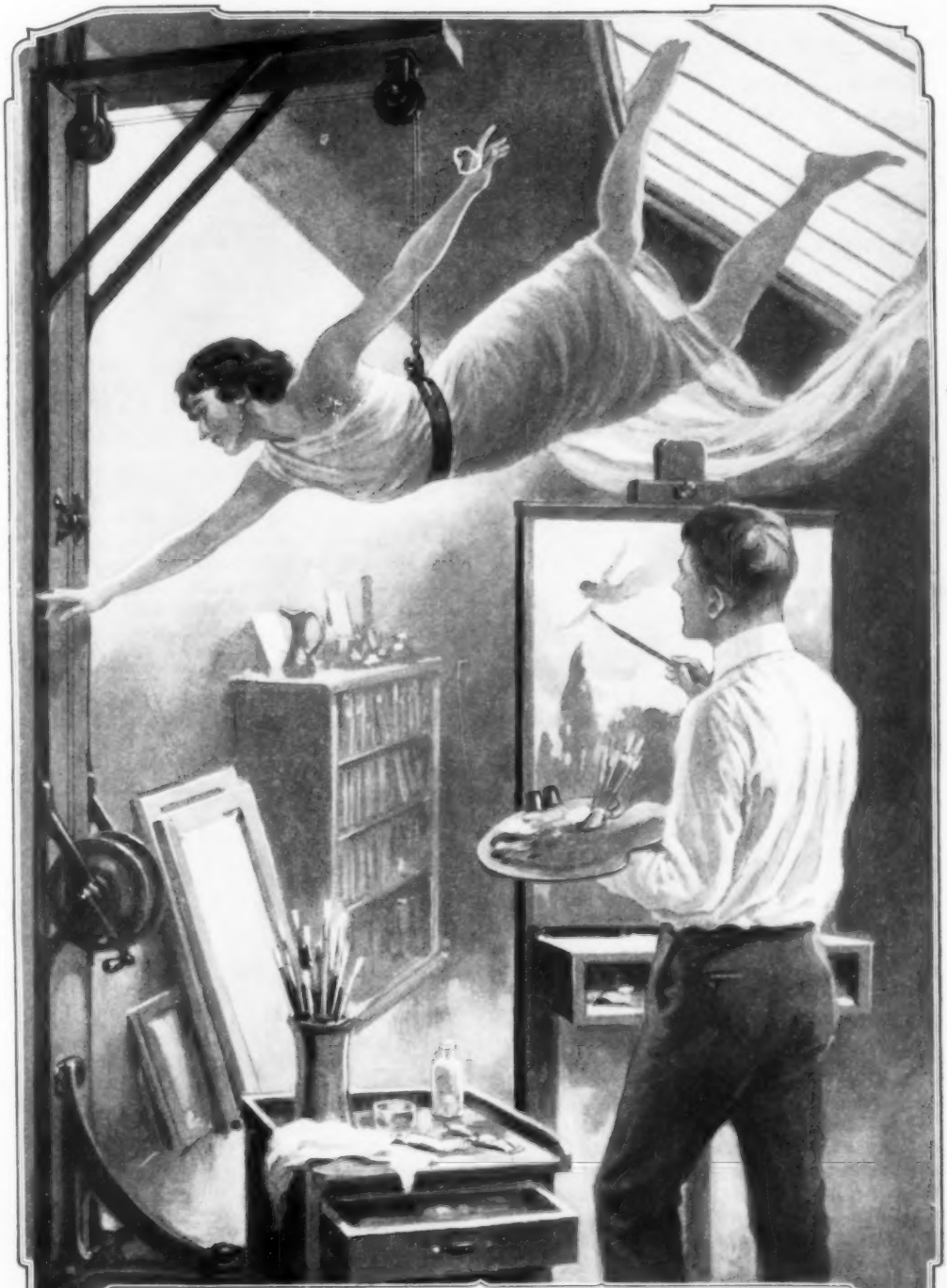
The sportsmen who recently used the seaplane for an afternoon's ocean fishing, as described in the October issue of this magazine, may prove to have been pioneers in an important commercial development. Following their lead, an official of the Bureau of Fisheries recently obtained from the Navy Department the use of a seaplane. For an hour and a half he flew along the New Jersey coast, at a constant altitude of 800 ft., and was thus able to locate many schools of fish. Several of the schools were at an estimated depth of ten feet. On his return he reported that the slanting sunlight sometimes lessened visibility, but that, on the whole, the seaplane should be of great service to the large fishing fleets. Informed by wireless of the presence of a school, they will be able to steam directly to the spot.

QUICKSANDS SWALLOW WRECK OF THE "VALBANERA"

Resting under 40 ft. of water off the Florida coast, but settling fast into the quicksands, is the wreck of a large steamer, identified by divers as the Spanish liner "Valbanera," and believed to have foundered at this point during the recent gulf hurricane. Not a soul survived to tell the story of the disaster; so, if the hull disappears, as seems to be the likelihood, the tragedy may take its place as one of the gruesome mysteries of the sea. As yet the divers have made no attempt to penetrate the cabins and learn what portion of the 488 passengers were still aboard when the steamer sank.

¶ A 20,000-hp. airplane and an engineless machine meant to be towed in trains behind an engined airplane, are among the forthcoming developments promised by a famous manufacturer of German aircraft.

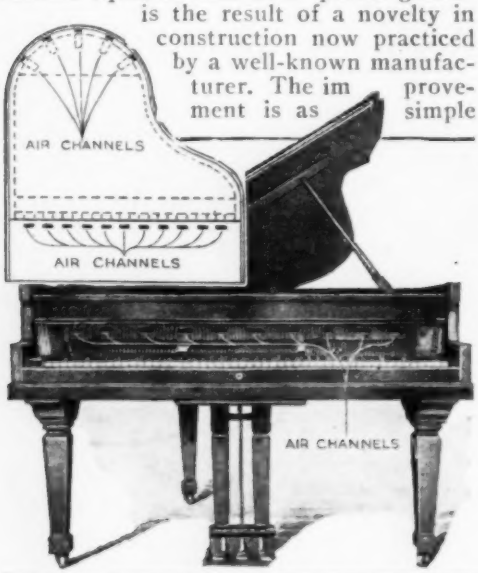
GALLOWS HOLDS ARTIST'S MODEL IN BIZARRE POSES



PERSISTENT questioning by his friends and fellow artists has at last won from a prominent illustrator the method which enables him to portray so successfully the human body in unnatural and fantastic poses. The model is hung by the waist from the arm of a gallows-like frame, which is itself easily movable on its wheels. The supporting wires from the belt run down to a ratchet reel.

SLOTS UNDER SOUNDING BOARD INCREASE PIANO-TONE VOLUME

A "baby grand" piano with a tone volume equal to that of a "parlor grand" is the result of a novelty in construction now practiced by a well-known manufacturer. The improvement is as simple



Locations of Air Slots are Indicated in the Diagram Above and Sketched on the Front View of the Piano

as it is effective, consisting solely of 15 slots bored in the vertical crosspieces that support the sounding board at front and rear. These slots permit air beneath the sounding board to respond to the vibrations of the latter and to reinforce those from above. Thus this lower air mass, customarily confined and deadened, is able to expand the tonal effect to an increased and unexpected volume, depth, and quality.

UNIVERSITY TO HAVE CAMPUS ON CHICAGO LAKE SHORE

The cloistered seclusion of the old-time universities is becoming less and less a characteristic of the modern institutions. Typical of the change is the recent decision of Northwestern University to establish a second campus within a mile of Chicago's busy loop district. On a nine-acre lake-shore tract will be erected a hospital and buildings for the departments of law, commerce, medicine, and dentistry. Land and buildings together will cost about $4,450,000. All these plans are contingent, however, on the outcome of a financial campaign for $25,000,000, of which $13,000,000 is to be raised during the present university year.

QUEER ROAD MIRAGE AT NIGHT MAKES AUTO APPEAR DOUBLE

An unusual and curious modification of the familiar highway mirage, caused by a layer of heated air, is reported from the Sacramento Valley, where the Pacific Highway is of glistening cement. At 9 o'clock on a recent night the lights of an automobile were seen to rise over a distant hilltop, and immediately another pair of lights, nearer but less bright, seemed to be turned on. The more distant lights gradually overtook the nearer, and merged with them, and an instant later a single car passed the observers.

GERMAN POCKET FLASHLIGHT CONTAINS OWN DYNAMO

A pocket lamp, containing its own dynamo and operated by hand power, has come to light only recently, although captured from a German soldier by an American major in the autumn of 1918. As worn upon the breast, a ring hangs by a chain from the bottom of the apparatus, where it is conveniently reached by the hand when light is desired. As the chain descends it spins an armature through a magnetic field, thus generating current and lighting the bulb. An energetic pull on the chain will keep the bulb lit for five seconds.

The German Dynamo Flashlight is Shown at the Left as Worn upon the Soldier's Breast. At the Right, the Covers have been Removed to Show the Rear, Above, and the Front, Below. A Sharp Pull on the Ring will Keep the Bulb Lit for a Number of Seconds

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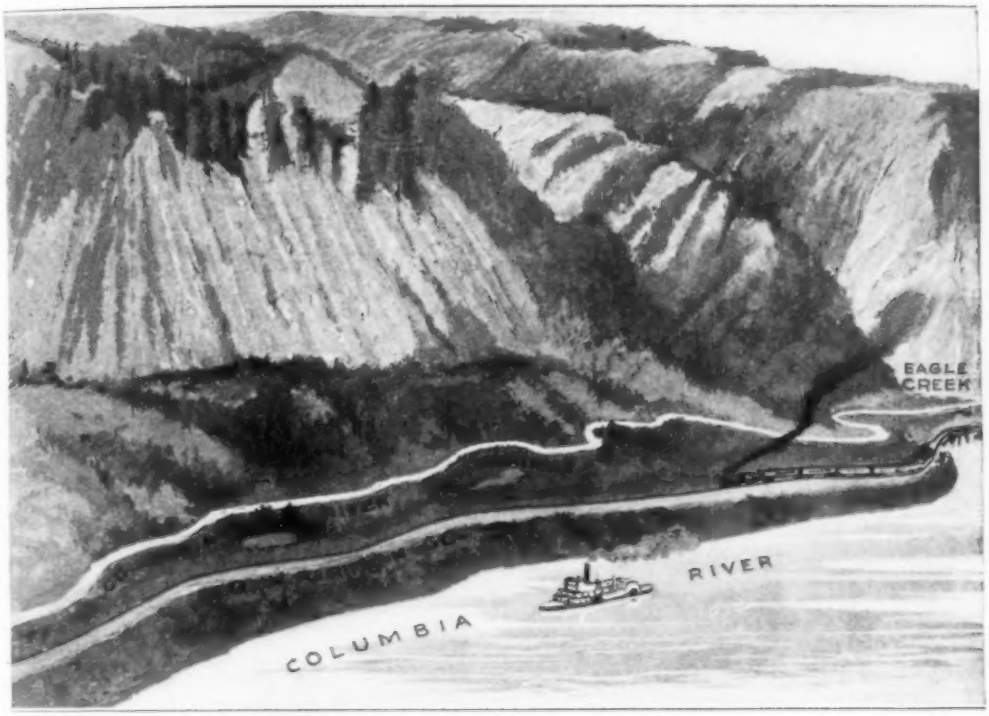


Separated from Bedrock by a Film of Water, the "Moving Mountain" of Oregon has, for Years, been Slowly Slipping toward Columbia River, at Times Necessitating Relocation of the Railroad Track along the Shore Line. The Scenic Highway has Not been Affected, and the Movement was Recently Stopped by a Tunneling Operation

ENGINEERS CHECK MOVING MOUNTAIN

Columbia River Threatened by Peak Which Slips on Moistened Bedrock

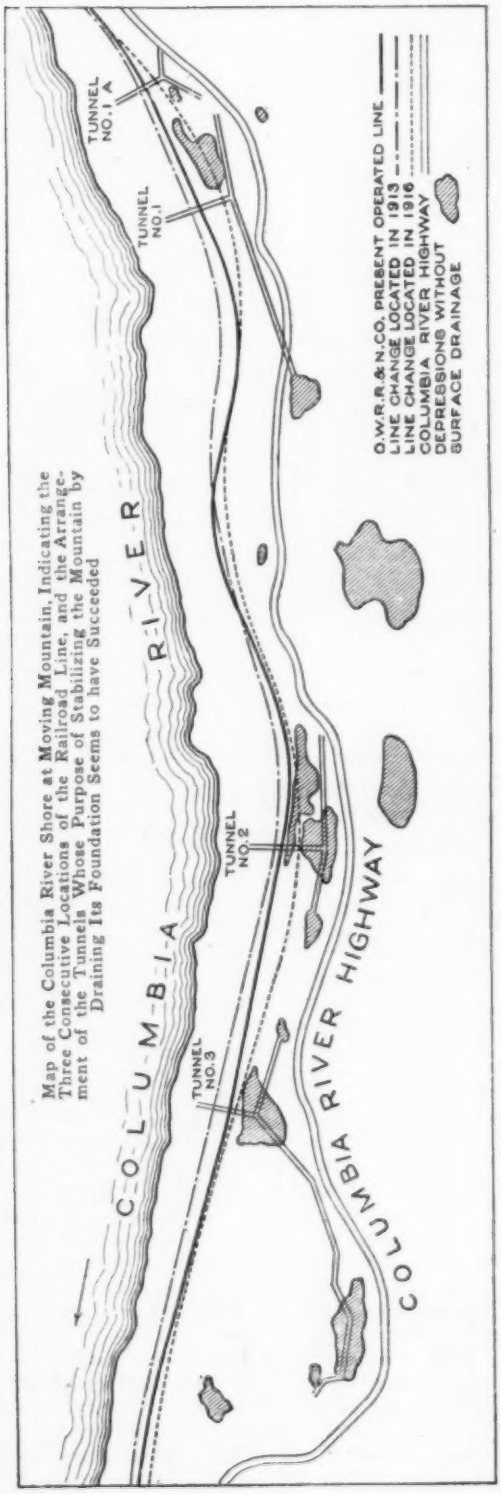
By HORACE E. THOMAS

WHEN an entire mountain becomes dissatisfied with its location and starts to slide, it means trouble for whatever happens to be in the way. Anyone who has noticed how even a small slide sweeps everything before it, appreciates the force in a moving mass of earth. When the slide includes a mountain, instead of simply a loose portion of its surface, the movement may be said to be irresistible. If stopped at all, it must be attacked by engineering strategy, for no force will prevail against it.

Moving mountains are rare but not unknown. The United States has had some very costly experience with them along the Panama Canal, as everyone recalls. The troublesome mountains near the canal, however, are mostly mud, and it is easy to understand how they stubbornly ooze their way into the waterway that severs the Americas, making no end of work for the big dredges that are maintained there.

A moving mountain of an entirely different type stands in a commanding position on the Oregon side of the Columbia River, between Cascade locks and Eagle Creek, about 45 miles from Portland. It is known as the "Moving Mountain," although for the past year there has been no movement, and engineers are hoping that they have succeeded, in a fight they have made through several decades, in staying its progress. They are not ready to say that the mountain is conquered, conservatively insisting on at least another year of observation before they will announce that they have won. To the layman, however, it looks very much as though the mountain had come out second best in its struggle to glide into the waters of the Columbia, and that, from now on, it will remain steadfast in its present location, as a well-behaved mountain should.

There has at no time been anything very precipitate about the movement of this Columbia River peak. It might have gone on indefinitely without attracting attention, if it had not been for the construction of a railroad at its base back



Map of the Columbia River Shore at Moving Mountain, Indicating the Three Consecutive Locations of the Railroad Line, and the Arrangement of the Tunnels Whose Purpose of Stabilizing the Mountain by Draining Its Foundation Seems to have Succeeded

in 1880. The engineers who surveyed the line were greatly surprised to notice, after several months, that some action had affected their location stakes. The change was slight, but sufficient to arouse their curiosity and apprehension. Definite observations were made from month to month, and from these it was determined that the land at this place was sliding toward the Columbia at the rate of 10 to 15 ft. a year. The movement was not great enough to cause abandoning the location, for the route down the Columbia was the only feasible one; and besides, the slide involved no real danger to the railroad then or since. But it did mean a vast annoyance to the railroad engineers, and an expense that has grown into hundreds of thousands of dollars.

At first, it was thought that the disturbance might be confined to a very small and localized area. Experiments quickly proved this premise wrong. It is known now that the movement affects the entire bulk of the mountain, which towers 3,000 ft. above the river, or at least a great segment of it that protrudes from the main peak. It is a point on which the opinion of engineers is divided, but the mass of moving rock and soil is, in either event, so great that the problem of meeting it is the same. While the progress of the slide from 1880 up to last year was not more than 15 ft. annually, it is believed that prior to 1880 the movement was exceedingly variable. Geologists do not know when it started or how rapidly it may have traveled before it came under observation, but they are convinced that its duration has been through many generations.

Unusual conditions combine to impel the movement of the mountain. The country along the river at this place extends for many miles in a series of hills and mountains that slope sharply toward the water. The Moving Mountain itself borders the river for three-quarters of a mile. Its face is a series of serrations, and there are several areas that have no surface outlet. Water gathering in these undrained basins seeps through the soil, reaching bedrock at a level somewhat below the surface of the river. To this drainage water is added seepage from the river, which flows in over the bedrock where it is exposed along the bank. As a result, the mountain rests on a thin film of water that covers the bedrock under its entire base. The tremendous weight on this thoroughly lubricated surface causes the movement. A peculiar

phase of the situation, determined by investigation, is that while the surface of the bedrock on the river bank slopes toward the river, this surface is a chiseled-off edge of the stratification, which really slopes backward and downward into the hill against the direction of the movement. The bedrock itself is an unusual type of shale, which has been termed by geologists the "Eagle Creek formation." The ground above it is a porous mixture of soil, shale, and basalt stones.

It is possible there would have been no soil disturbance if it were not for the excessive rainfall in this district, which averages about 80 in. a year, and has been known to exceed 100 in. It is one of the dampest localities in the United States. The Columbia River rainy season is chiefly from November to June, so that the mountain reaches its point of highest saturation in the spring, and it is at this season that the movement is at its maximum.

Little Streams Like This One Form a Network among the Mountains of the Columbia River Valley, and Cause Landslides by Loosening the Earth

The constant creeping of the soil into the Columbia, like an earth glacier, would have shoaled the river long ago had it not been for the swift current at this place. The average flow of the water here is from 8 to 10 miles an hour, while at high stages it attains a velocity of 12 miles. This swift current, which is immediately below the dashing, foaming Cascades of the Columbia, carries away material from the slide as fast as it reaches the water.

As the railroad traverses the slide for its full length, the tracks needed frequent attention. Quite often, small sections had to be moved, bridges erected, and fills made, while on occasions it was necessary to change the location of the rails for the full distance. This, obviously, was an expensive process, and engineers at once set about remedying the trouble at its source by stopping the slide. Until recently, surface drainage was depended on to accomplish this. Efforts were made to drain the low areas, for it was reasoned that if the water did not permeate the mountain, the slide would stop. Surface drainage, however, proved a failure, for despite long-continued efforts in this direction, the slide persisted, with its progress diminished little if at all.

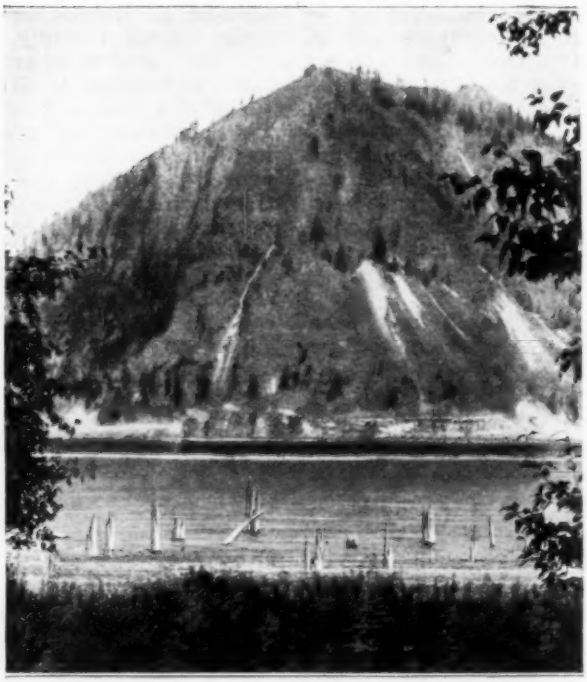
The new plan of attack, which has stopped the slide, at least temporarily, consists of a series of drainage tunnels. They were built in 1918, after a long series of experiments to determine the points of greatest movement. The portals of the tunnels are at about normal high-water level of the river, and they have a depth of 50 ft. When the tunnels had penetrated the mountain for some distance drifts were dug at right angles to reach the most advantageous locations.

The tunnels have offered drainage for the film of water that covered the bedrock surface, and a large volume of water has been concentrated in them. As soon as the tunnels were completed, last year, the slide movement ended and has not, so far, recurred.

The famous Columbia River Highway now parallels the railroad at the base of the Moving Mountain. It had been built only a short time before the slide was stopped and was not affected. If the movement should begin again, frequent changes of the highway, as well as the railroad, would be necessary. However, this is a contingency that is not anticipated, for it is generally believed that the tunnels have solved the difficulty permanently.

The Moving Mountain comes by its migratory tendencies quite naturally. There are a great many slides all about

it along the Columbia Gorge, where the river has bisected the Cascade Range. Some of the slides are still active, while the activity of others has ceased. "The land surface is one of pit and ridge, of inclosed swale and crumbling, tilted divides, of clogged drainage, wherein streams drop from sight, springs issue and disappear, ponds fill, then mysteriously depart," runs a graphic description of the district by a geologist who spent months in study there. "To add to the mêlée, all is clothed with forest, and if evidence were needed that this whole great honeycombed slope not only has been, but is now, slowly in motion, none more conclusive could be asked than the abundant forest wreckage that is present everywhere. Giant firs, individually and by the acre, lie flat, and at all angles from prostrate to vertical. Tops lean together, foundations settle away. Even the works of man are not exempt; buildings are carried out of plumb, trails offset, roads upheaved; and at the river's edge on both sides, we are told, the railroad rights of way refuse to remain within statutory bounds. In a word, this entire area is one of landslides, landslides of the past and landslides that are now, while we watch, taking place."



Part of the Submerged Forest in the Foreground. Across the River, Shellrock Mountain, Afflicted with Small Landslides, Which Are of the Surface Only

So much slipping and sliding is attributed chiefly to the "Eagle Creek formation," mentioned before. This shale is a hardened, ashy clay which underlies the basalt at many places besides the immediate vicinity of Eagle Creek. Wherever a layer of it is found, there, generally speaking, is observed a marked

View down the Columbia River through the Submerged Forest, or Rather Its Desolate Remains: Plainly a Region That Was Once High and Dry on Shore, Indicating the Possible Fate of Other Lands along the River

tendency to slip over its surface. The entire gorge of the Columbia may almost be termed a cañon. Its precipitous cliffs rise from a few hundred to several thousand feet close beside the river on both the Oregon and Washington shores. The whole history of the gorge has been a series of slides; as the stream cut into the beds of shale these dissolved, and the hardened lavas above dropped into the current and were carried away. In many places, as has been said, this process is still going on. It is predicted that at certain locations it will continue until the majestic Columbia, which discharges into the Pacific each year 16 cubic miles of water, will flow between gently sloping banks. Such a transformation, if it takes place, will be a process of ages and something that will be seen only by our descendants in the dim and distant future.

One of the most remarkable of the slides along the Columbia lies on the Oregon shore, opposite the village of Wyeth, seven miles east of Cascade locks. Here an entire forest has slipped into the river. So gradual was the movement and so large the mass of earth that the trees, or many of them, still stand upright in the stream.

The "Submerged Forest" is known by all who are familiar with the Columbia. At normal stages of the water the tops of the highest trees barely protrude above the current. It gives an uncanny feeling to the boatman to ride over the tops of these ancient trees, which can be seen distinctly in the clear water beneath. The submerged forest has had its part in the Indian legends with which the Columbia Gorge abounds. One version of the legend of the famous "Bridge of the Gods," which tradition says once spanned the Columbia, a great natural arch, is that these trees grew upon it, and that they remained standing when the gods in anger destroyed the bridge and it collapsed into the stream. Scientists now are agreed that the Bridge of the Gods is only a myth. But scarcely less wonderful than this and the other traditions that cling around the greatest river of the West are the land movements that are now going on as Nature carves anew the outlines of the mighty gorge of the Columbia.

OCEAN LINERS WILL BURN OIL AND SAVE COAL AND LABOR

The economies and advantages of oil fuel for the propulsion of ocean liners has been so well demonstrated that the giant "Leviathan" is to be converted to an oil burner by the U. S. Shipping Board. A number of other big passenger ships also will be changed to use liquid fuel, among them the "Olympic," the "Aquitania," the "Mauretania," and possibly the "Imperator." As an example of the saving thus to be effected, it is stated that a 20,000-ton ship requires 3,000 tons of coal for a transatlantic trip, as against 1,500 tons of oil, and the latter can be loaded in 12 hours, the coal taking three days or more. The subtraction of 50 men from the engine-room staff, a reduction of roughly 75 per cent, is an even more important consequence of oil burning, from the economical standpoint, because of the wage situation. Just now, however, the conservation of coal is the interesting feature of the new project.

FOOT-POWER AUTOMOBILE IS SERIOUS VEHICLE ABROAD

Those little foot-power automobiles that are known only as children's toys in this country are being taken quite seriously abroad, with the increasing cost of gas power. A two-seated tandem model made in France is now becoming popular in England at a price

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French Foot-Power Automobile for Two Passengers, with Regular Car Springs and Pneumatic Tires, Now Popular Abroad: The Steps on the Side Take the Place of Doors

seemingly high enough to include an engine instead of pedals. The body has no door, steps being provided for entrance over the side. Semielliptical springs and pneumatic tires make the car usable on the road.

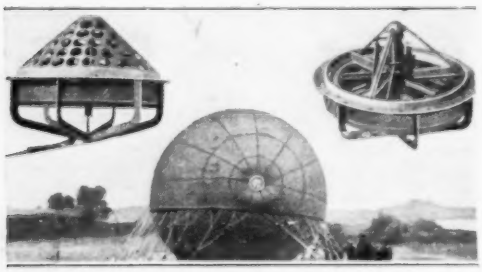
CONFINE TRACTORS TO FIELD WITH SUBSTANTIAL FENCE

Surrounding the tractor-testing field at the University of Nebraska is a fence of unusual appearance and strength, designed to prevent the machines from being piloted off the inclosed area by inexperienced student drivers. Massive concrete posts, 3 ft. high and situated 8 ft. apart, are connected by a heavy chain which passes through holes near their tops. This barrier stops the tractors with a minimum of damage.

Unruly Tractors are Kept within the Testing Field of the University of Nebraska by a Sturdy Fence of Concrete Posts and Chain

VALVE MAINTAINS UNIFORM PRESSURE IN BALLOONS

If the dirigible, kite, or other balloon be likened to a huge beast of the air, the large valve which maintains uniformity of gas pressure must be termed its "lungs." Placed often in the nose of a dirigible, and controlled from the pilot's seat, when necessary, by a cord, the valve opens and shuts automatically when hydrogen must be released to effect stabilization. Were this vital mechanism to stop functioning during a rapid rise of the balloon, it is evident that the gas would expand the bag to the breaking point as the outer air pressure decreased. The valve was originally designed by a Frenchman, but has been greatly improved for use in the American navy.



The Complete Valve of the Left View is Seen at the Right with Its Casing Removed, and the Center View Shows the Way It is Installed in a Balloon

INEXPENSIVE COATING FOUND FOR SAFETY-MATCH BOXES

A comparatively cheap material for coating ignition surfaces on safety-match boxes is being manufactured in a Slovakian city as a substitute for antimony, commonly used for this purpose, but now very scarce and high in price. Besides being low in cost, the product is declared to be much lighter and more efficient than the substance it is intended to supplant. A smaller proportion of certain expensive and easily ignited chemicals is required in match heads and on striking surfaces, if the composition is used, it has been revealed by tests.

VIOLIN ATTACHMENT MAKES FALSE NOTES IMPOSSIBLE

Although many teachers of the violin condemn any mechanical aids to instruction, the ingenuity of a new fingerboard attachment will in itself win attention. Clamping the attachment upon the fingerboard, the pupil depresses the strings by means of small semicircular studs or stops. Fingering is thus made mechanically exact.

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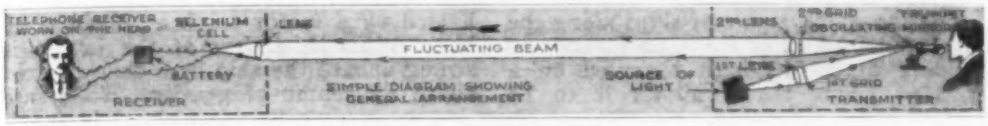
The Semicircular Studs on This Violin Attachment Enable the Beginner to Avoid False Notes by Depressing the Strings Only at the Proper Points

¶ From certain South Sea islands for which Japan is now "mandatory" 41 natives have recently been brought for a month's visit to their new mother country. The government plans to entertain a similar delegation each year.

TALKS OVER BEAM OF LIGHT BY OLD IDEA MADE NEW



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Using the Improved Transmitter It Is Possible to Make a Beam of Light Bear a Conversation between Points a Mile and a Half Apart. The Diagram Explains the General Arrangement of the Transmitter and Receiver, and Suggests the Value of the Invention for Military Use. It Is Obviously Impossible for an Enemy to "Listen In" Secretly as He may So Easily Do with the Electric System Now in Vogue

When the inventor of the telephone devised his "photophone" and talked along a beam of light in 1889, he accomplished a scientific marvel. But apparently his ingenuity was not sufficiently appreciated to encourage practical development; for the idea—it was scarcely more than that—has lain dormant all these years. The announcement of its sudden appearance in usable form, and its actual application to war signaling, comes now with all the force of new discovery.

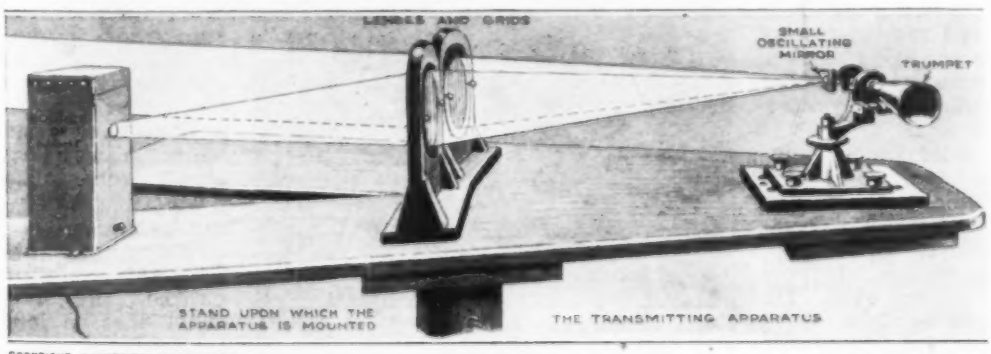
The photophone's method of operation is essentially the vibration of a beam of light by reflecting it from a diaphragm against which sound waves are directed. The receiver is a cell of selenium, which changes its electrical resistance with the variation of light falling upon it. When the selenium is connected in series with a telephone receiver and a source of current, the receiver diaphragm vibrates in exact accordance with the transmitter diaphragm. This was the original device.

The improvement, made by an English inventor, is simple but quite effective. It consists in throwing light upon the sending diaphragm through a grid, or plate containing fine parallel slits, making an image on the diaphragm mirror of alternate light and dark lines, concentrated by a lens. The composite beam thus reflected passes through a second similar grid and lens, and then to the distant receiver. As the sending mirror vibrates, it is the interference of the second grid with the reflected image of the first that gives the light fluctuations sufficient variation for practical use. With this equipment, whispers were audible at a mile and a half, using 20-in. projectors and sunlight, while a carbon arc gave good results up to one-half mile.

PREPARE FOR TRIAL TRIP OF LARGEST AIRPLANE

The French airman, Lecointe, reputed to have been the first to guide an airplane over a three-mile course in one minute's time, has now been chosen to pilot, on its trial trip, the world's largest plane. Unfortunately a detailed description of the big craft cannot be secured from the manufacturers at this time. It is divulged, however, that the wing span is 175 ft., which exceeds by 49 ft. the measure of the famous Handley Page four-engine bombers. Despite its size, the ship is expected to attain a speed of 120 miles an hour.

¶ The Barnard statue of Lincoln, about which lately centered so much discussion, has at last found a home. It has been presented to the city of Manchester, Eng.



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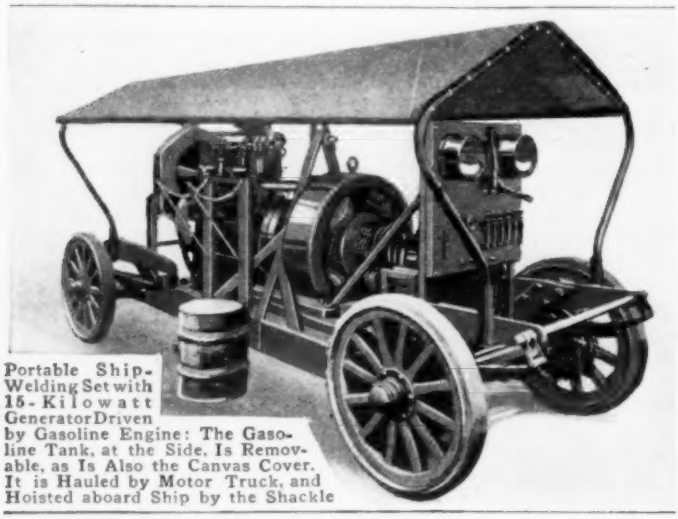
This Picture Illustrates in Greater Detail the Improved Transmitting Apparatus. Light from the Source at the Left Filters through the Bars of the Grid and Is Focused on the Mirror. Oscillated by the Vibrations of the Human Voice, This Little Mirror Reflects the Light against the Second Grid. A Shutterlike Effect is Thus Obtained, the Final Transmitted Beam Varying in Character with the Sounds Made

SHIP-WELDING SET RUSHES TO JOB ON TRUCK

For the quick repair of ships along the San Francisco water front, an emergency welding outfit has been mounted on a wheeled frame which allows it to be hauled by a motor truck at 20 miles an hour. When it arrives at the job, it is swung aboard the ship by a shackle fixed above its center of gravity. To assure its balance while hoisting, and for safety at night, the gasoline tank is removable. A welding generator of 15 kw., gasoline-engine driven, is supplied with several hundred feet of cable, and welding terminals for two arcs. An air compressor and welding pressure tank permit chipping and scaling work, as well as welding, to be done. For protection in the open, a canvas cover is supported by a removable frame of piping at each end. The engine is cooled by water pumped from the sea.



Portable Ship-Welding Set with 15-Kilowatt Generator Driven by Gasoline Engine: The Gasoline Tank, at the Side, Is Removable, as Is Also the Canvas Cover. It is Hauled by Motor Truck, and Hoisted aboard Ship by the Shackle

TYPEWRITER AND WADING POOL FOR MONKEYS

From California, London, and Benares, India, the camera sends the photographs on this and the opposite pages as evidence of simian intelligence and similarity to man. Most noteworthy is "Joe Martin," orang-outang by birth and motion-picture actor by profession, who plays stellar rôles in many melodramas. "Joe" is under constant instruction by his trainer, and already handles a typewriter with an appearance of professional skill. He inserts and removes the paper, punches indicated keys, and balks only at "taking dictation."

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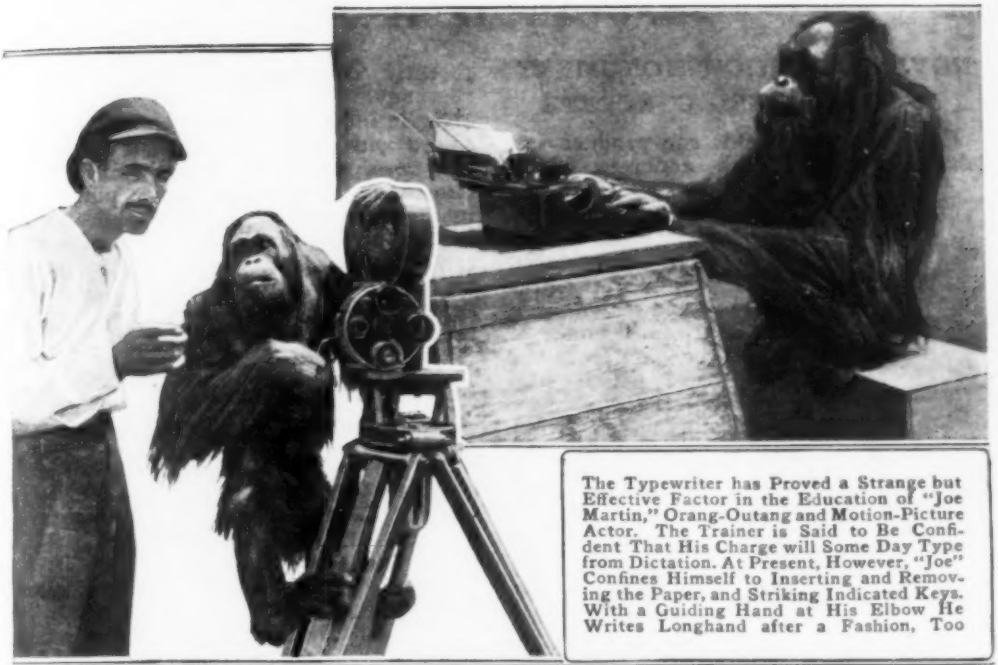
This Long-Tailed Variety of the Monkey Tribe is Treated with Reverent Care in Benares, India, and in Many Near-By Villages. The Sacred Animals Supplement the Offerings of the Faithful by Regular Tours of the Public Garbage Heaps

The smaller animals in the London zoo recently gave the lie to the popular belief that a monkey hates water, by frolicking in a pool provided experimentally in their outdoor cage. Spectators were delighted to see the troup halt at the brink for a moment's admiring inspection, then wade in boldly. In an instant several were splashing each other like human merry-makers, while others washed faces and hands, or enticed the few timid ones to join in the fun.

The Indian scene shows a street in Benares.



The Typewriter has Proved a Strange but Effective Factor in the Education of "Joe Martin," Orang-Outang and Motion-Picture Actor. The Trainer is Said to Be Confident That His Charge will Some Day Type from Dictation. At Present, However, "Joe" Confines Himself to Inserting and Removing the Paper, and Striking Indicated Keys. With a Guiding Hand at His Elbow He Writes Longhand after a Fashion, Too

Under the Direction of His Trainer, "Joe Martin" of California, is Cranking the Picture Camera. He has Won His Fame, However, Not behind but before the Camera, Where His Solemn Mimicry has Delighted Thousands of Movie Audiences

Contrary to the Popular Belief That a Monkey Dislikes Water, These Little Inhabitants of the London Zoo Greeted Most Enthusiastically This New Bathing Pool. The Monkey on the Platform Proved One of the Few Exceptions. Spectators Laughed to See Him Dip a Tentative Finger in the Water, Then Retreat in Disgust to His Solitary Perch

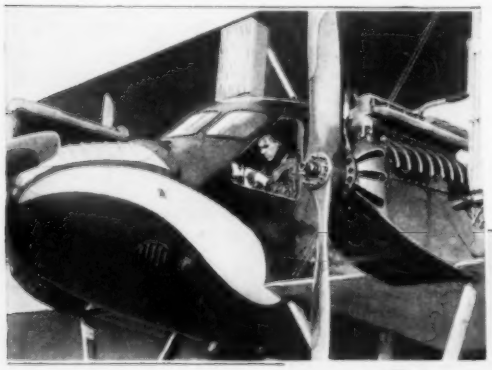
BY COURTESY OF LA NATURE

NOVICES FASHION MONUMENT OF REINFORCED CONCRETE

Even unskilled hands can produce satisfactory results with concrete. This is proved by a cross of that material, erected near Lewistown, Pa., by iron workers, directed by a priest, in honor of the men from the local parish who entered the army and navy during the war. The unusual monument is 21 ft. high, with a horizontal arm 9 ft. 4 in. long. It weighs, with its base, 12 tons, and is reinforced with 800 lb. of iron. A 14 by 16-in. metal plate, set in one side of the upright, bears the names of 42 service men. The cross was designed by the minister.

AMERICA'S FIRST TRI-MOTORED LAND PLANE PASSES TESTS

Distinguished as the first three-motored land airplane to be designed and built in the United States, and incidentally as one of the country's few large passenger-carrying machines, is the "Eagle," a graceful commercial craft recently demonstrated by the Curtiss company. The inclosed fuselage seats eight in individual wicker chairs, each beside a window of unbreakable glass. In the nose, facing their controls, sit the two pilots. The safety of the passengers in flight is assured by the triple nature of the power plant, any unit of which can maintain flight when the plane is not loaded to capacity. The interesting tandem arrangement of the undercarriage reduces the risks of landing.



Through the Open Window in This New Three-Motored Commercial Plane is Seen Roland Rohlfs, Famous High-Altitude Pilot

PHOTOS COPYRIGHT, WESTERN NEWSPAPER UNION

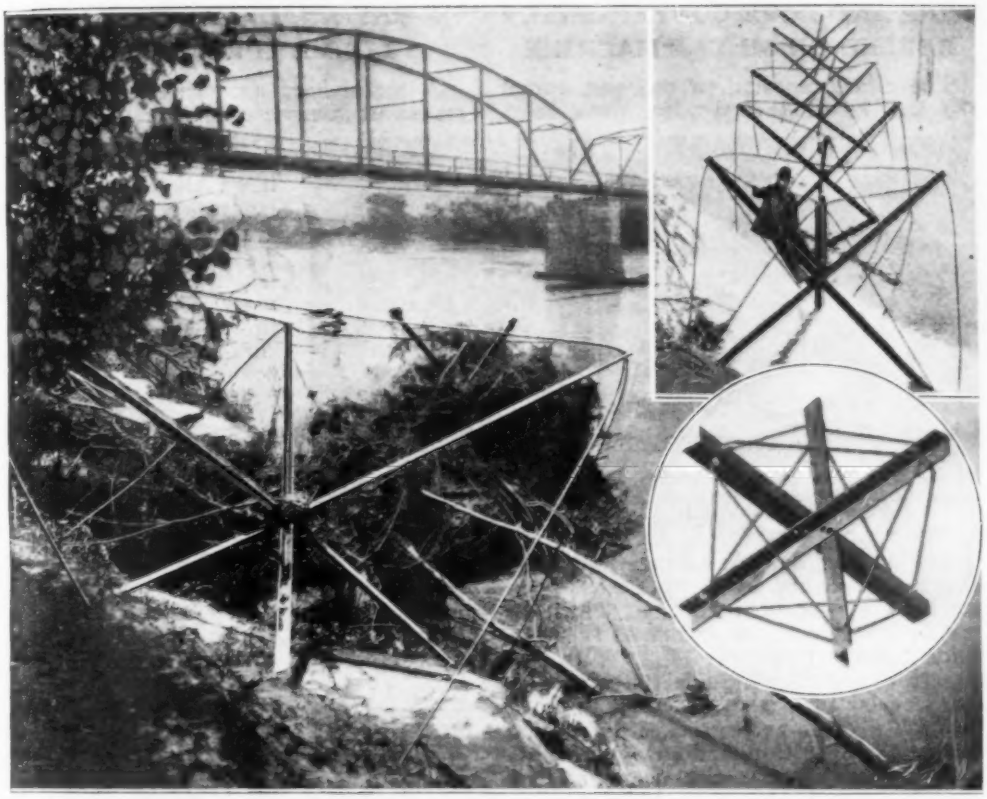
A Flying Radius of 475 Miles, a Maximum Speed of 107 Miles an Hour, a Triple Power Plant, Substantial Undercarriage, and a Comfortable Cabin, All Combine to Make the "Eagle" a Reliable and Satisfactory Passenger Carrier

TOMB OF CANADIAN TRAPPER IS LONELY LOG CABIN

A humble log cabin which stands in a trackless forest near Lake Athabasca, in western Canada, was once the home of a fur trapper, its builder. Now it is a tomb, sheltering the frozen body of its former occupant, who died there, alone and unaided, nearly two years ago. To investigate the cause of the trapper's death, a fearless member of the Royal Northwest Mounted Police journeyed to the desolate scene in midwinter, braving the terrors of the wilderness for months before reaching his objective, situated miles from railroads and civilization. The corpse was in a perfect state of preservation, due to the cold, dry air, and was not moved from the bunk on which the trapper passed away.

SIMPLE STEEL JETTIES STOP CUTTING OF RIVER BANKS

After all the riprapping of river banks, the driving of piles, and building of willow mattresses to stay the enormous destruction of property by flood waters, a Kansas inventor has checked the erosive

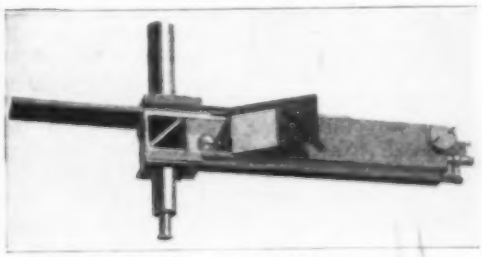


The Appearance of the Steel Jetty, After Nature has Given Its Assistance, is Seen in the Large Picture; the Upper Insert Shows a Newly Installed Six-Unit Jetty, and the Lower a Steel Unit in Detail

process with the simplest of devices. His invention consists of three similar lengths of angle iron, bolted together at right angles at their centers, making a figure like the "jacks" of children's games. Four or more of these units are strung on a cable through their centers, one end of which is anchored to the river bank. The protruding ends of each "jack" are also wired together. The outer end of this improvised steel jetty is then flung out into the current, which begins at once to deposit brush and silt about the multiplex legs of the strange dike. Presently a new point of land is formed, and the river has returned what it stole away.

MAKE INSTRUMENT TO GAUGE VISIBILITY OF VESSELS

To reduce the protective coloration of ships to an exact science, a "visibility meter" has been developed in an American laboratory. By means of a transparent reflector at a 45° angle, the observer sees simultaneously a lens image of the object and a translucent screen illuminated by a small electric lamp. Turning a thumb disk moves a wedge of gray glass behind the object lens and changes the position of the lamp, thus altering the relative brilliancy of the image and the glare of the translucent screen. The optical field is bisected, one half appearing brighter than the other, for photometric comparison. In use, the image is reduced to low visibility and compared with a standard test plane of canvas painted a flat white.



COURTESY OF THE JOURNAL OF THE FRANKLIN INSTITUTE

Visibility Meter Open, Revealing 45-Degree Mirror, Translucent Screen with Lamp, and Wedge

WIRE AND ROPE CONVENIENTLY REELED ON SIMPLE MACHINE

The effort required to reel and unreel the lengths of barbed wire, rope, hose, and chain used daily in a dozen industries is largely reduced by a wheelbarrowlike machine of recent invention. Thus, to reel in loose wire, the owner of this machine simply pushes it along with the two front wheels astraddle the wire. As the wheels turn they revolve the reel through a chain-and-sprocket drive. To reverse the operation, and unreel the wire, the operator throws the chain off the sprockets, permitting the reel to revolve freely. The reel may easily be removed to permit the insertion of another.

Above, Side View of Reel; at Right, Front View, in Which the Driving Chain and Sprockets Are Visible

FIBER BOARD USED TO MAKE HOLDER FOR INK BOTTLE

Uncorked ink bottles are a source of danger on desks and drafting boards, because of the possibility of their being overturned. For preventing such accidents, a simple holder, made from a small square of fiber board, has been invented by a Kansan, who applied not long ago for a patent on the unusual inkstand. A circular opening is provided in the center of the material by dividing a circle of proper size into 12 sectors, and bending the latter at right angles to the sheet. When a bottle is placed in the opening, the sectors act as lugs to hold it in place.

X-RAY ANALYZES CHEMICALS LIKE A SPECTROSCOPE

A method of analyzing chemicals by means of X-rays, used in a manner suggesting the spectroscope, has been developed in a large American industrial laboratory. The X-rays are passed first through a monochromatic filter which absorbs all but one wave length, and then through two narrow slits, reducing them to a beam about 1/25 in. wide. The material to be analyzed, in powder form, is placed in a small tube in the path of the beam, and the rays transmitted are registered on a photographic plate. Minute variations in crystalline structure are shown as fine lines, parallel to the main image, and their pattern and degree of separation indicates, to the practiced eye, the composition of the chemical.

PEARLS NO OYSTER MONOPOLY: TRIPE YIELDS THEM TOO

True pearls, from 1/32 to 1/16 in. in size, were found in large numbers on the mucous surfaces of a recent shipment of tripe received in England from the United States. That the occurrence was not unusual, but had merely escaped previous notice, was shown by the examination of fresh specimens taken from native cows. The pearls were soft, of course, each imbedded in a cyst, and apparently developed, just as in a bivalve, by the casting of a protective mucous wall about some intruding parasite.

CITY SAVES FORTUNE IN SOAP BY SOFTENING ITS WATER

It is generally known that hard water requires more soap for the same results than soft water, but the scale on which the city of St. Louis has demonstrated the fact is quite unusual. The municipal precipitation plant is computed to have saved the people $260,000 in soap alone in the last year, which is more than the cost of chemicals and labor for the process. Over 400,000 tons of solids, mostly sand, were taken from 37,751,000,000 gal. of water during the year.

COMMENT AND REVIEW

[This page was printed Oct. 27, 1919]

FROM the shapeless heaps of ruins in what were once towns and villages in Belgium and France, the dull débris is already taking on the outlines of streets and building lots. The impoverished owner returns to a staggeringly hopeless prospect, but he spares no effort to do his part toward the restoration of his beloved city. The hours of daylight are all too short, his physical endurance incapable to measure up to the effort of his ambition.

Stop
Look
Listen

In Germany, tremendous activity is putting forth its trained hand, guided by that marvelous ability for organizing industrial operations, and before the rest of the world realizes, German goods will again be flooding the markets of every continent. To regain their lost trade, they aim to undersell other nations, especially the United States. In order that they may undersell, the German workman—to whom no sacrifice for the Fatherland is too great—is already feverishly working 10 and 12 hours per day in the factories of that country.

There are not wanting those who believe that much of the agitation in this country, the fomented unrest, the demand for the six-hour day, and five-day week, finds its inspiration in anything but a sincere desire to benefit American workmen. It is certainly very plain that whatever clogs the wheels of production in any one country, making that production smaller in quantity and higher in cost, reverts to the great advantage of any other country whose manufacturing costs are less. This is not to say it is desirable to work 12 hours a day, nor that more than eight hours a day is necessary in the great majority of occupations, nor further, that by a natural process of development and invention, the work of the world may not be eventually accomplished in a six or five or four-hour day.

But I do assert there never was in the world's history such need of production as now, and if all the workers of the world, including labor unions, in order to get supplies back to pre-war normal, would turn in and work diligently, with their old pre-war pep in what they do, for ten or even eight hours a day for a short time, the result would be felt in lower prices almost immediately. Instead, the present attitude of labor unions is to arbitrarily demand a decreased production at a higher cost, and base their demands on the resulting higher cost, for more, and more, utterly regardless of the effect on the larger body of workers who belong to no union. And the profiteers are just as bad, or worse, for they have a wider vision and a better realization of what they are doing. It seems to be a sort of industrial joy ride in which each group is trying to outrun the rest, regardless of who, or how many, are run over in the race.

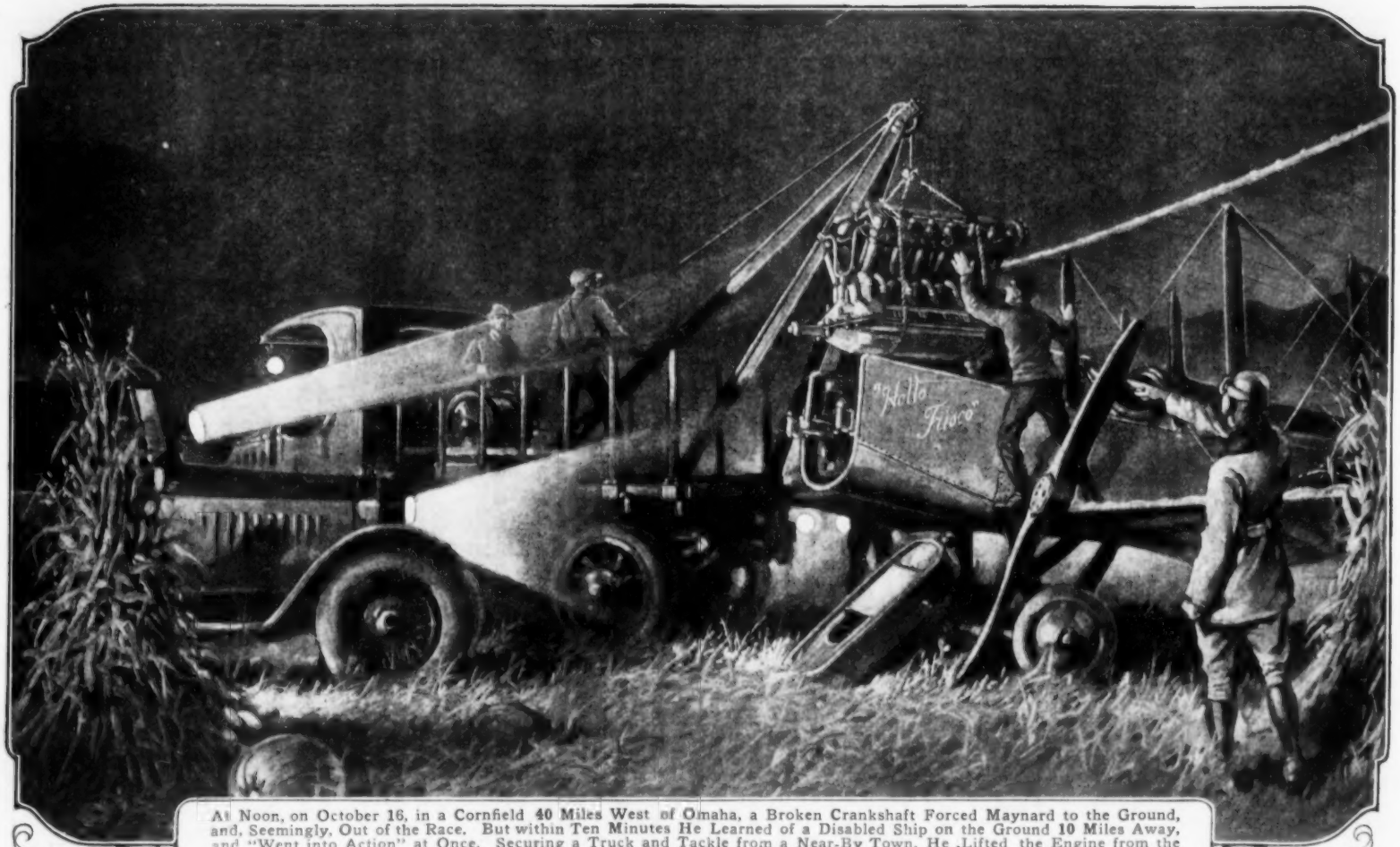
I think the sanest statement on conditions today was uttered by Secretary of the Interior Lane, when he said:

"Oh, for a few days of real sanity, when with composed nerves and calm judgment, and without bitterness of feeling, we could look at our problems and meet them with our traditional hopefulness and confidence."

What we all need is coöperation; less selfishness for ourselves and the group to which we belong, and more regard for the rights of others. The war has left us all more or less affected by shell shock, with blurred vision and shattered nerves. The ideals of the millennium cannot be achieved or forced by any process of legislation by Government, or the fiat of organized labor. It can only come as fast as an overwhelming public sentiment believes in and supports it. This is a growth, not a miracle. Any other way is futile, just as national prohibition was the result of 50 years of effort and education, and could not and did not arrive until time had done its work.

When labor officials, intoxicated with success, attempt to paralyze the industries and welfare of the entire nation with a coal strike, coupled with the threat to call out all union members in every other line of industry, it becomes evident that some labor leaders have utterly lost their heads, and no longer realize what are the real and best interests of their own members. The attitude of some labor leaders during the past few weeks has unfortunately set back the cause of labor. The ideals and hopes of President Wilson have been interpreted as license, and Labor, while being led out of Egypt, is being led into the Wilderness. It is up to those same leaders and that great majority of union members who, following lines of least resistance, have allowed the radicals and ambitious leaders to dominate them, now to do some plain thinking on their own account and get the cause of labor squarely on its feet once more.

H. H. WINDSOR



At Noon, on October 16, in a Cornfield 40 Miles West of Omaha, a Broken Crankshaft Forced Maynard to the Ground, and, Seemingly, Out of the Race. But within Ten Minutes He Learned of a Disabled Ship on the Ground 10 Miles Away, and "Went into Action" at Once. Securing a Truck and Tackle from a Near-By Town, He Lifted the Engine from the Damaged Airplane, and Hurried with It Back to His Own. By the Glare of Headlights and Bonfires, He Labored All Night, and at Sunrise Was in the Race Again

"FLYING PARSON" FIRST TO COMPLETE LONGEST AIR RACE IN HISTORY

By PAUL A. JENKINS

SEVERAL purposes doubtless impelled the Air Service authorities to announce in September an aerial race from coast to coast. Foremost, no doubt, in their minds was the desire to awaken the American voter, and through him the American congressman, to an appreciation of the airplane as a military weapon. America must realize that the invader who will some day force a landing on the California coast will, three or four days later, dot the skies above New York City with his bombing planes.

And to the Air Service itself the race was to demonstrate the relative reliability of various types of planes and motors, to furnish meteorological data for the still crude air charts of this country, and thus to help the United States keep abreast of aviation's progress.

The selected course led from Mineola, Long Island, 100 ft. above sea level; westward across state after state, to the mountains of Wyoming, Utah, and California, which are sometimes 6,000 ft. above the sea; and finally to the Presidio in San Francisco, at practically ocean level again. From coast to coast and back the course was figured to be 5,402 miles, or about the length of a sea voyage from New York to Petrograd, Russia. The rules were relatively few, requiring chiefly that each contestant fly only between sunrise and sunset, not on Sundays or in impossible weather, and that he stop for at least 30 minutes at each of the 20 intermediate control stations. Prizes were to be awarded, much as in the New York-Toronto Derby, under a triple system embracing elapsed time irrespective of efficiency and flying time, actual flying time as calculated between control stations, and flying time based on handicaps.

The contest was exclusively miltary, so participation was limited to army airmen and army machines. The list of pilots entered at starting time totaled more than 80 names, and included those of several American "aces," and, by military courtesy, those of two foreign attachés. The great majority of the planes were American DH-4's, powered by 400-hp. Liberty engines, although others were of French, British, Italian, and German origin, driven by Hispano-Suiza, Mercedes, Rolls-Royce, Clerget, and other motors.

Simultaneously from east and west on the morning of Wednesday, October 8, the air race started. Plane after plane roared into the air at intervals of a few minutes, until 47 had left the eastern metropolis, and 15 San Francisco. A few of these were to finish the long grind, but many were destined to crash to earth, others to wear themselves out against the buffetings of rain and snow. One plane was to fall into Lake Erie, another to collide with an abrupt mountainside in Utah. The adventures of all contestants, the stories of too many tragic deaths, would easily fill a volume.

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This Is the "DH-4" and Its Crew That Finished First in the Air Race from Coast to Coast and Back. Lieutenant Belvin W. Maynard Is at the Right, and Sergeant W. E. Klein, at the Left, with "Trixie," the Mascot, in the Center

Interest aplenty, however, is found in the single story of one competitor, once a preacher, later a fearless tester of America's war airplanes, and recently one of the winners in the international air handicap between New York and Toronto. By Wednesday evening, Lieut. B. W. Maynard led the entire field. Spending the night in Chicago, he learned of pursuers at Cleveland, and rivals from the west at Salt Lake City. Thursday gave him the roughest weather of the entire trip, but saw him at evening in Cheyenne, Wyo. A westerner had reached Omaha, while other competitors were scattered across the breadth of the United States. Here in Cheyenne Maynard was held all Friday morning by the bursting of his radiator.

Friday night he slept at Salduro, Utah,

just 2,183 miles from Mineola, yet hard pressed by three fleet westerners who spent the night at Bryan, Ohio. In the morning he rose 13,000 ft. to clear the mountains, and a little after 1:00 p. m. slipped out of the fog to the ground at San Francisco. Two hours later two westerners arrived, within 20 seconds of each other, at the eastern terminus.

Tuesday afternoon saw him on his way once more, first of the racers to start upon the return trip. Good fortune flew with him during that day and the next, actually showing him an opening between two snow blizzards while over Wyoming. Thursday noon, however, when only 40 miles from Omaha, his crankshaft snapped and forced a hazardous landing in a fence-hemmed cornfield. For some men, the race would have ended here, but not for the "flying parson." Displaying an energy that will some day dismay the evildoer in his parish, he wired to Washington for permission to use an engine from the Martin bomber, stranded some ten miles away. While waiting for permission, he got the engine.

Laboring all that night in the cornfield, with the friendly assistance of local people, the plucky parson and his clever mechanic in the morning climbed into a rebuilt plane.

Then came a tremendous spurt of 738 miles, that included every short cut and the hazard of a flight across Lake Michigan. For, though still leader, Maynard was now pursued by five who were doubling back from 'Frisco, while five from the Pacific had turned back from Mineola. But good fortune now joined hands again with skill, and Saturday found him once more in Mineola, this time hailed as first to finish the transcontinental Derby, and recognized king of America's airmen. His nearest competitors from the east were at Buffalo; from the west, at Omaha.

As this magazine goes to press it is learned that, because of his unavoidable mishaps, Maynard's computed flying time is set at 67 hours, a figure which has been bettered by several later arrivals at Mineola. To others will consequently be awarded the prize for the shortest flying time, and, probably, for flying time as revised on the handicap basis. Yet these secondary defeats by worthy rivals can little dim the honor of Maynard's victory, achieved by his skill, expertness, and pluck. The "flying parson" was first to finish the longest air race in history.

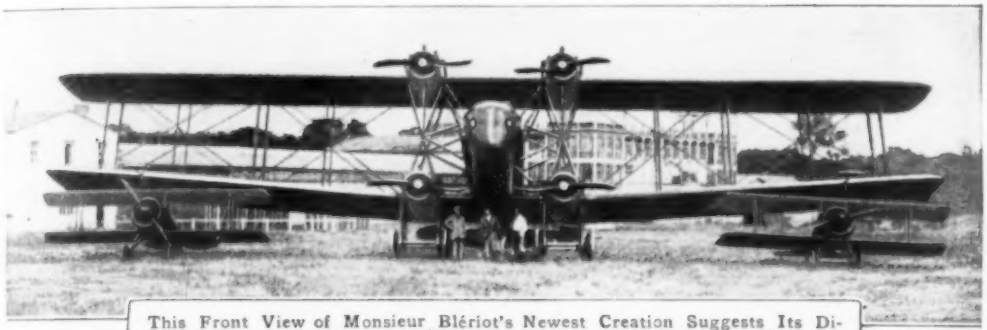
JAPANESE ROADSTER WEIGHS ONLY 120 POUNDS

A practical three-wheeled automobile which weighs only 120 lb. is the recent invention of a Japanese army officer. The little vehicle is powered and steered by the 3-hp. motor wheel in front. Behind the chauffeur, who straddles the frame, sits a passenger in a midget tonneau equipped with side doors and a folding top. The mounting of the body on the rear wheels is unusual for so small a car. The short stub axles project from a rectangular frame the rear end of which bears the body on coil springs, while the front end is coupled to the body by a universal joint.

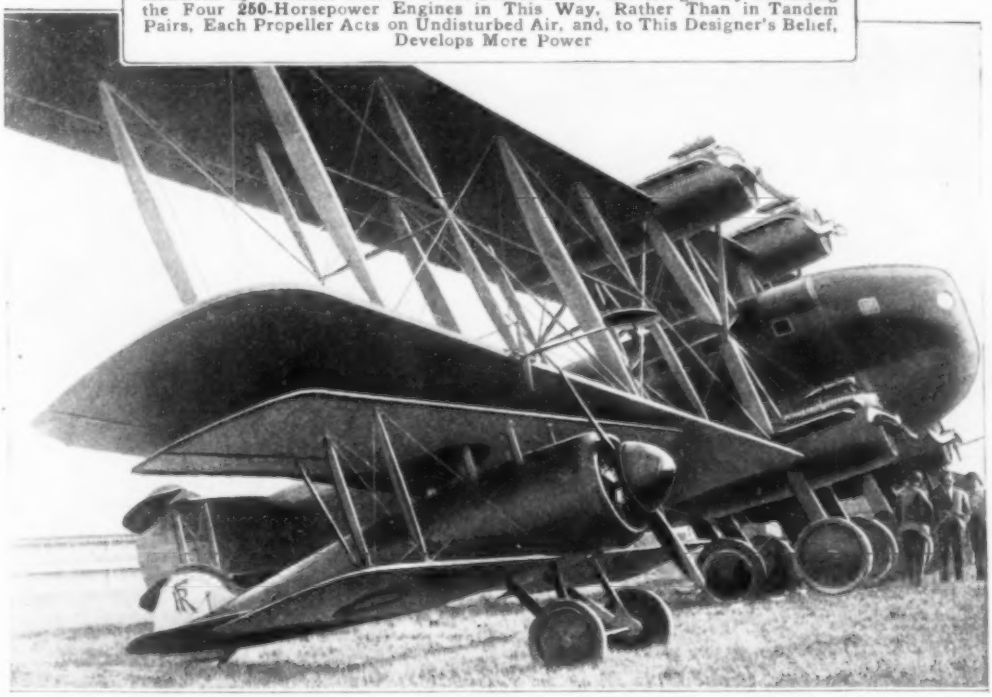
The Three-Horsepower, Two-Speed Engine in the Front Wheel Takes This Little Motor Car Along the Roads of Japan at a Lively Clip. The Inventor, an Officer in the Japanese Army, Has Attempted to Make the Little Car a Mechanism of Utmost Simplicity

PLAN TO FILM WHOLE BIBLE

Most ambitious of all projects of the motion-picture art, celebrated for its extraordinary aspirations, is the plan to film the entire Bible. This momentous effort is already in process of organization in a California studio, and is estimated to need two years for its completion. The specifications call for 100 reels of film, certain scenes of which will gather together the greatest assemblies ever shown on a screen.



This Front View of Monsieur Blériot's Newest Creation Suggests Its Dimensions by Contrast with the Scout Planes under the Wings. By Mounting the Four 250-Horsepower Engines in This Way, Rather Than in Tandem Pairs, Each Propeller Acts on Undisturbed Air, and, to This Designer's Belief, Develops More Power



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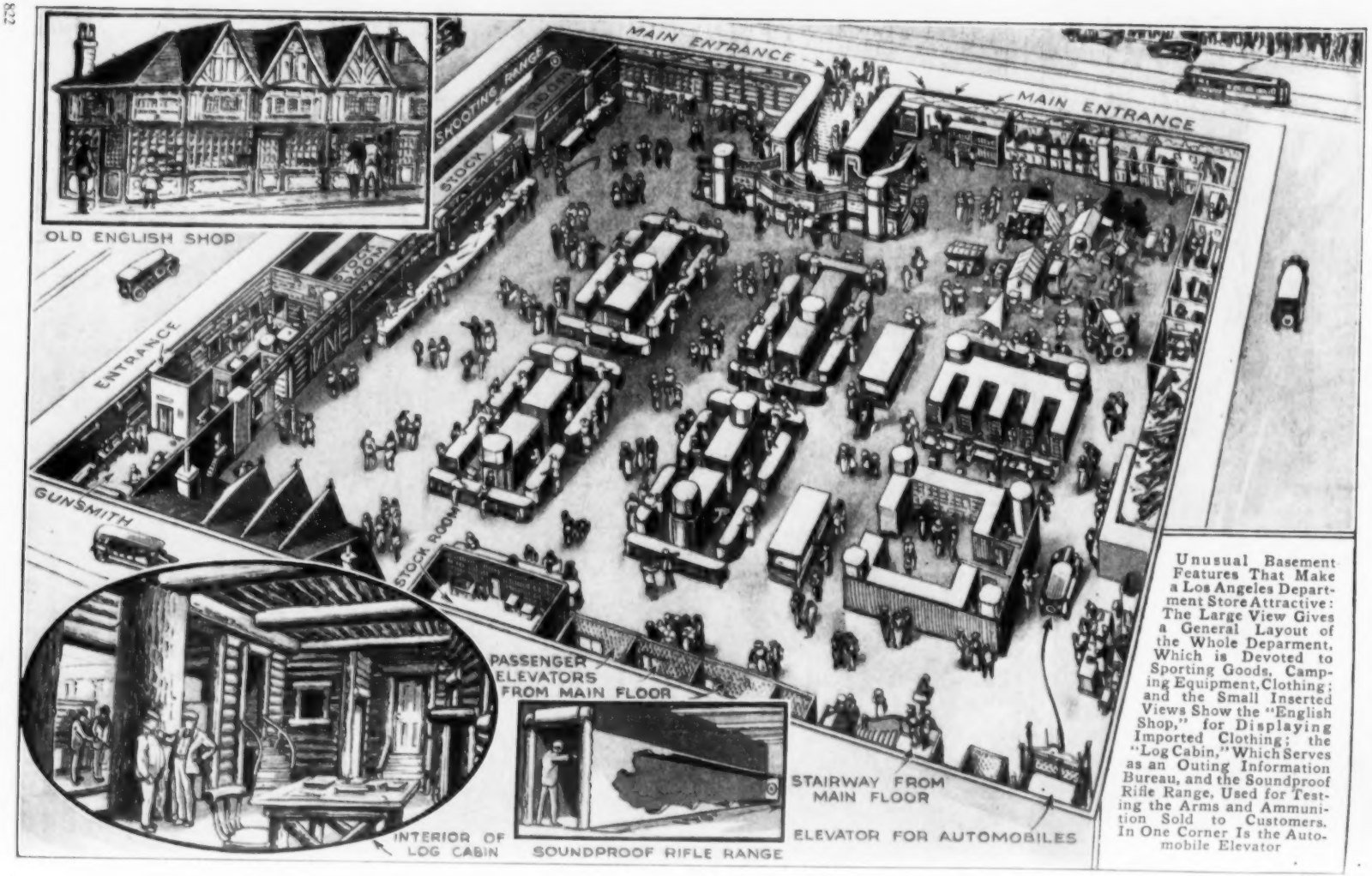
The Whalelike Profile of the Fuselage is Seen in This View of the Newest French Airbus. Within Are Seats for 28 Passengers, Exclusive of the Crew. In Providing the Heavy, Tandem Undercarriages the Builder has Evidently been Willing to Sacrifice Speed to Gain Safety for the Passengers. The Banjolike Projections from the Leading Edge of Each Lower Wing Are Worth Study Also

HUGE BIPLANE DESCENDANT OF CROSS-CHANNEL BUS

In contrast to the fragile little 35-hp. monoplane in which he flew across the English Channel in 1909, appears M. Blériot's latest production, a substantial biplane airbus driven by four engines of 250 hp. each. The two creations are strikingly dissimilar, yet are alike in evidencing the pioneer's courage to depart from conventional practice. As his monoplane was the first successfully to mount a tractor air screw, so the big air liner is seen to incorporate the engine mountings in the wing structures, two above and two below. The fuselage is notable for a proportionate "stubbiness," which is accentuated by its height, odd streamlining, and by the backward stagger of the wings. The banjolike levers on the leading edge of each lower wing indicate that the designer has aimed at a measure of automatic lateral stability.

¶ To help stabilize foreign exchange, a form of international currency is suggested by delegates to an international trade conference, held in Atlantic City.



Unusual Basement Features That Make a Los Angeles Department Store Attractive: The Large View Gives a General Layout of the Whole Deparment, Which is Devoted to Sporting Goods, Camping Equipment, Clothing; and the Small Inserted Views Show the "English Shop," for Displaying Imported Clothing; the "Log Cabin," Which Serves as an Outing Information Bureau, and the Soundproof Rifle Range, Used for Testing the Arms and Ammunition Sold to Customers. In One Corner Is the Automobile Elevator

BASEMENT SPORTING STORE HAS ODD FEATURES

A rifle range, aquaria containing native trout, a log-cabin bureau of resort information, and a projecting room for movies of a sporting flavor, are among the novel trade-getting attractions just installed in the basement of a Los Angeles department store. This subterranean bazaar is given over to the sporting-goods section, and entrance to it is made inviting by a stairway of exceptional width and easy descent, which opens at the front of the store. Customers in autos, however, may make a more spectacular entrance, for a big elevator carries them, car and all, down to the basement level.

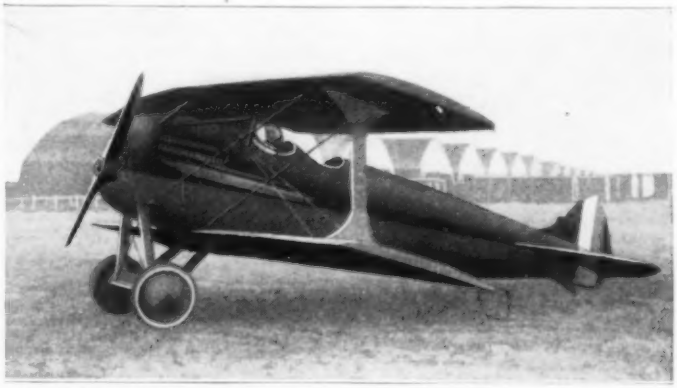
The shooting gallery is attached to the gun department, and is used for testing rifles, but the tanks with their five species of trout, the cabin with its answers to all outing questions, and the movie hall with its educational pictures and lectures, all are features of general service. They emphasize the effort to make the basement department even more attractive to a high-class trade than the levels generally preferred. A luxurious lounge is another service feature whose usefulness is increased by a stock of books likely to interest the customers of the department. The method of displaying an imported line of sportsmen's clothing is also unusual. A section of the basement is fitted up as an old English shop, complete with its gabled roof.

PLAN CANAL UNDER JERUSALEM TO IRRIGATE HOLY LAND

If the proposals of a Norwegian engineer are carried out, there will soon be a subterranean canal directly under the city of Jerusalem, carrying water from the Mediterranean to the Dead Sea, irrigating the wilderness of Judea, and providing copious electric power at the mouth of the Jordan. For the Dead Sea, that strange body of heavy saline water, is 1,292 ft. below the level of the Mediterranean, and not more than 50 miles away. The unnatural direction of the drop will have no effect on the practicability of the plan, and the waters of the big sea to the west, entering through canal and pipes, will help the inadequate Jordan to freshen the contents of the basin, in whose vast depths the mineral and biological scavengings of the whole valley have been trapped and concentrated for thousands of years, with no possible escape. An ample electrical supply, available for the modernizing of the Holy City and other communities that have made no progress since their names were recorded in the manuscripts of the Bible, is an interesting prospect. But more important still is the promise that great areas of land, barren since history began, may be made to blossom forth for the support of an always needy population.

IMPROVED SPAD FLIES BETTER THAN THREE MILES A MINUTE

With the aid of wind or gravity, airplanes have in the past attained a speed of 180 miles an hour; but to a French Spad, powered by a 300-hp. Hispano-Suiza engine, goes the distinction of traveling at that rate under normal conditions and official supervision. The record flight was made several weeks ago at an altitude of 2,000 ft., and near the town of Villa Coublay, France, by M. Sadi Lecointe, famous tester of war machines.



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A Speed of 184 Miles an Hour Is the Record Recently Hung Up by This Improved Spad. The Simple Wing Bracing, Thorough Streamlining, and Featherweight Monocoque Fuselage Are All Features of Refinement

¶ To promote the "ship-by-truck" idea, an industrial parade was held in Brooklyn a short time ago in which more than 2,500 motor trucks appeared, many of them prepared as elaborate floats. The parade lasted two hours.

Popular Mechanics features will appear in moving pictures issued by Paramount Magazine.

PNEUMATIC-TOOL SUSPENDER TESTED BY SHIPBUILDERS

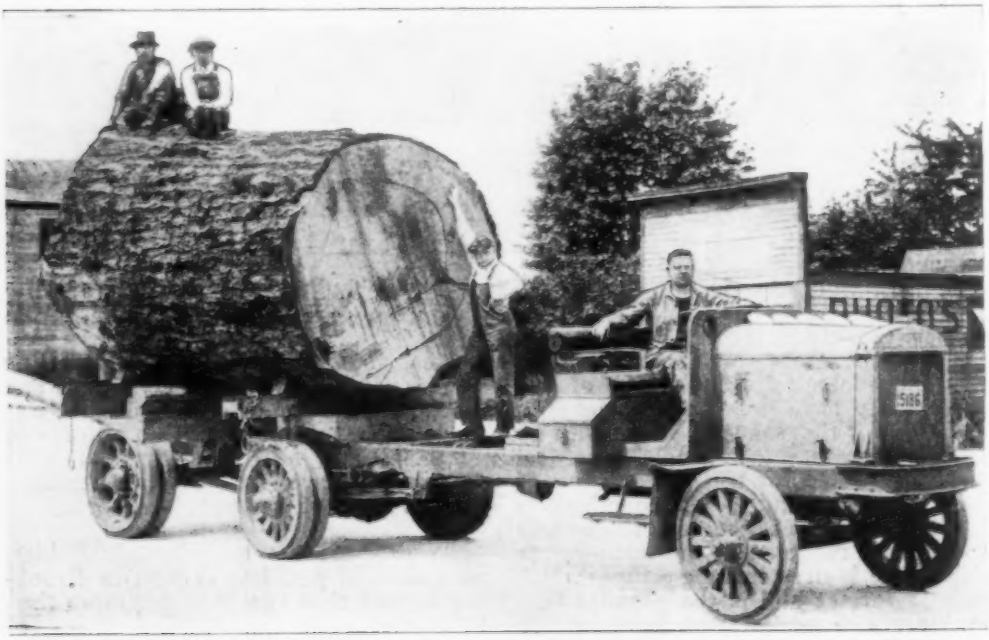
Intended to suspend heavy pneumatic tools in convenient positions on perpendicular surfaces, such as the sides and bulkheads of steel vessels, thereby relieving workmen of a tiresome task, a device is being tested in an English shipyard. A two-wheeled carriage runs on a horizontal steel track, which is held in place by brackets designed to be thrust into rivet holes. Attached to the carriage underneath are two pulleys, over which a rope is passed. At one end of the rope a tool is fastened, while at the other is a counterbalancing weight. The contrivance allows the manipulator to devote all of his energy to guiding the tool.

SWEDISH DRY DOCK ON LAND ABOVE WATER LEVEL

A dry dock now in process of construction by a lumber concern at Ljusne, Sweden, to accommodate its own freight carriers, is remarkable for the fact that it is not in the water at all, but is high and dry on land, above sea level. It is 328 ft. long, and accommodates vessels of 4,000 dead-weight tons, which will enter it by means of a lock, fed by a water-power canal from the Ljusne River. By the same means the dry dock can be filled with water, and emptied by gravity, without any use of pumps. The cost of docking will thus be greatly reduced.

ENORMOUS LOGS TRANSPORTED ON MOTOR-TRUCK TRAILERS

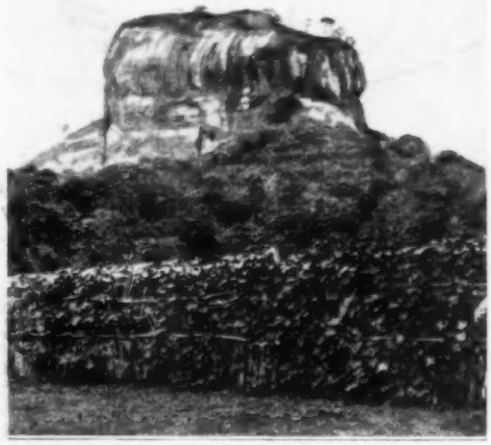
Placed on sturdy motor-truck trailers, built especially for that purpose, huge fir logs are hauled through the streets of a northwestern lumber town from the terminus of a narrow-gauge railroad, which penetrates the woods, to a sawmill not far away. Quite frequently the great sections are 10 ft. in diameter. Their weight is tremendous. The trailers are constructed to facilitate loading and unloading by a small crew of men.



Carrying a Great Fir Log to the Sawmill: This Section of a Tree Trunk Is a Heavy Load, Even for the Powerful Motor Truck That Pulls the Strongly Constructed Trailer on Which It is Borne

HUGE ROCK PILLAR IN CEYLON IS OLD FORTRESS

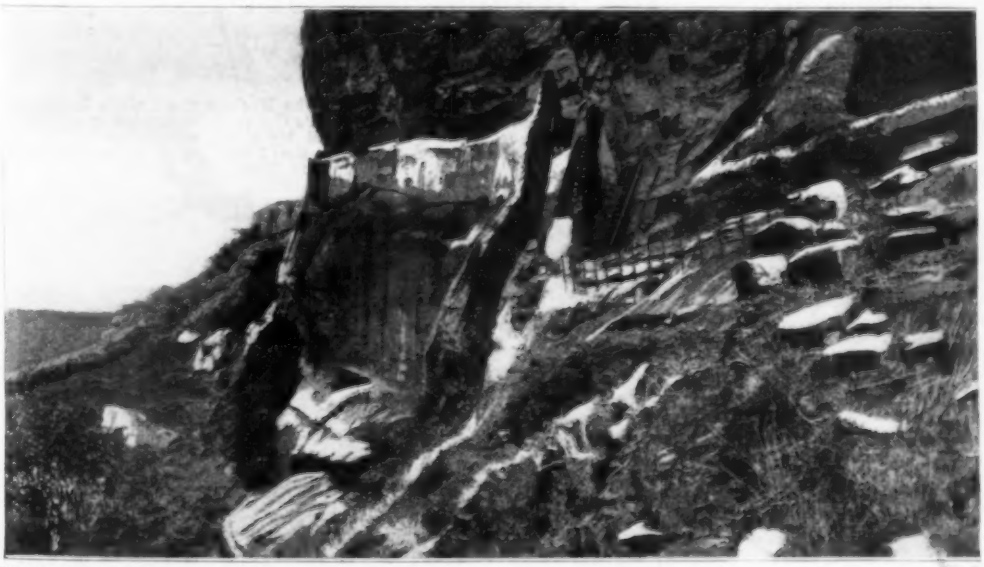
MONUMENT to a murderer's guilt, Sigiri Rock abruptly lifts its solitary head hundreds of feet above a jungle-matted plain in central Ceylon. Traveling from the coast, one is impressed, while miles away, by this towering pillar of granite whose sides rise perpendicular until they swell to a bulging crown. Coming closer, one is surprised to see a parapet coil upward from the tree-hid base to the distant top.



On the Sides and Top of This Granite Pillar in Central Ceylon Still Exist Remains of Defensive Works and Houses Built in the Fifth Century, A. D., for a Fugitive King and His Court

One then recalls one of the most tragic episodes in Ceylonese history, and knows that he faces Sigiri, the ancient inland Gibraltar, upon whose inaccessible summit cowered Kasyapa, the parricide, from 477 till 495 A. D. For it is written that old Dhatu Sena, the father, ruled wisely the prosperous isle till his death at the hands of this second son. The infuriated populace looked with hatred on their new ruler; while Mugallana, the crown prince, fled across the narrow sea to India, where he raised an army to reclaim his heritage. So the slayer grew afraid in his ill-fortified capital city of Anuradha-pura, and one day ordered his engineers to cut a roadway up the unscaled sides of Sigiri, to erect on the top a palatial refuge for himself and his train, and to fortify the whole.

The feat would be difficult today; what labor it must have been for these early craftsmen, imagination can only suggest. It is known, however, that wooden wedges, forced into every accessible crevice, were largely used to burst away the solid granite. In this fashion the circling gallery was hewn from the overhanging rock, was later surfaced with brick and limestone slabs, and finally protected by a high brick parapet that often found



PHOTOS BY FRANK BURNETT

Fourteen Centuries Ago Kasyapa's Engineers Hewed Out This Broad Pathway to the Top of Sigiri Rock. Their Achievement is Appreciated, However, Only When It is Known That the Tools Chiefly Employed Were the Hammer and the Wooden Wedge

Recently Uncovered by Archæologists, the Winding Pathway is Seen to Consist of Solid Brickwork Covered by Close-Fitting Limestone Slabs

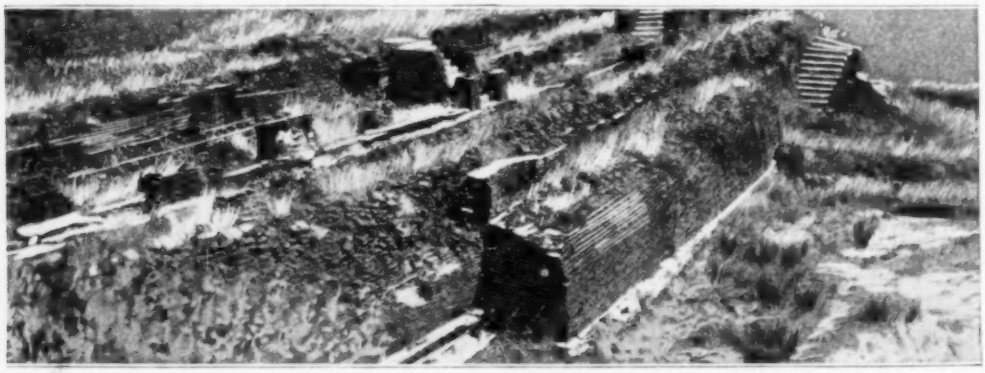
a footing only on some projecting ledge, many feet below. Near the top, defensive gates of metal were hung between the outstretched paws of a gigantic brickwork lion.

And the wonder of it is that the broad stairway may still be used for the climb to the summit. Only the lion and the brickwork of the southwest face have been vanquished by the yearly monsoons of 14 centuries.

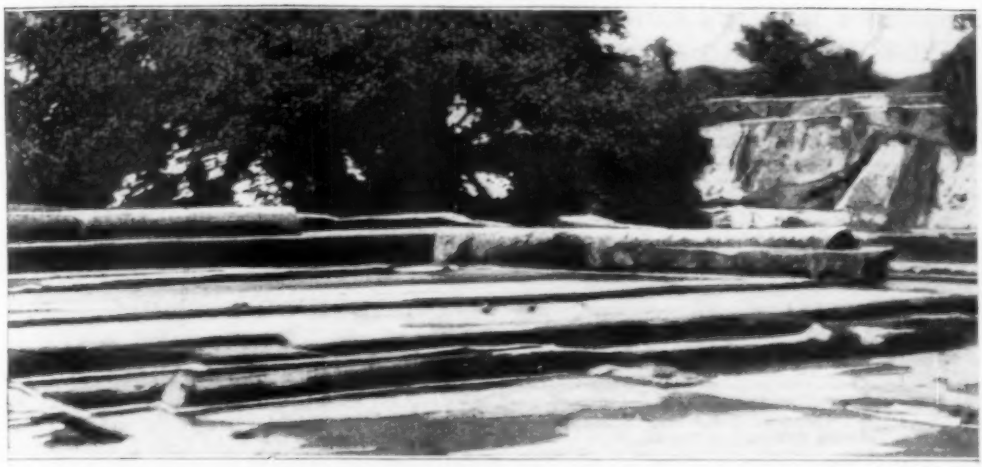
Reaching the top, Kasyapa's retreat is found to be unbelievably spacious, containing, in fact, five and a half acres of inhabitable surface. Here are seen well-ordered terraces where once stood the homes of the courtiers; the throne-room floor, still flat and smooth as a billiard table, and, most interesting of all, the remains of a great brick reservoir, or tank, in which was caught every drop of rain-water from every roof in the aerie city.

For these few brief years the summit was the scene of busy, crowded life. Though virtually a fugitive, the murderer still ruled his isle as king; so kept by him his many followers. All these lived upon the pillar's top; the chronicles show that some were actually forced to extend beams over the dizzy edge, and upon them perch their homes.

The Rectangular Opening in the Rock at the Left is Called by Legend the "Bath of Kasyapa's Queen." Whatever It may have Been, It is Still Approached by a Flight of Narrow Steps. Beyond, to the Right, Lies the Level Floor of the Spacious Throne Room



Like Sailors Becalmed in a Ship at Sea, the Inhabitants of the Strange Capital Hoarded Every Drop of Rain That Fell from the Sky. A Gutter Led from Each Roof to This Brick Reservoir, Where the Vital Fluid was Conserved against Future Periods of Drought. Incidentally, as the Island Has No Rivers of Great Volume, and Not One Inland Lake, the Ceylonese have Always Been Expert Builders of These Reservoirs



The Throne-Room Floor, Seen beyond the "Queen's Bath" on the Opposite Page, is Here Shown in Greater Detail. Grass and Trees in Every Crevice Now Replace the Structures That Rose 1,400 Years Ago from the Granite Surface, Yet This Smooth Floor Remains. The Imagination can But Feebly Suggest the Infinite Labor Which must have been Required of the Builders as They Chipped Away the Solid Rock

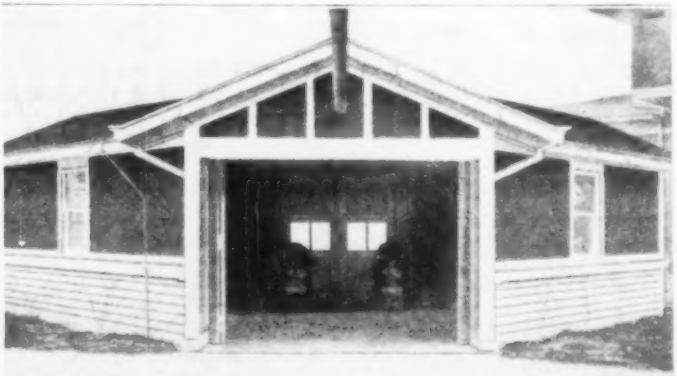
In the year 495, on the plain below, the guilty king was killed; silence again engulfed the lonely rock; and since that day it has stood almost undisturbed, and little known to history as one of the world's great natural fortresses.

MOST POWERFUL TANKS BUILT AT AMERICAN ARSENAL

The largest and most powerful war tanks ever built by any government are now under construction at the Rock Island arsenal of the U. S. Army. Each is driven by a Liberty motor at an average cruising speed of seven miles an hour. Every member of the crew, which consists of one officer and 10 men, must be a motor mechanic, a machine gunner, and an expert with the six-pound rifle. Campaigning in the new tanks will not be as fatiguing as in the old, however, as the improvements include a self-starter, electric lights for the interior, and a compartment which is separated from the motor and ventilated by forced draft. Worth mention, also, is the proposal that the exhaust manifold of each tank be equipped with apparatus for generating a smoke barrage at will. Thus the tank might screen itself, or unite with others to hide the advance of the infantry.

TWO CARS USE SINGLE DOOR IN L-SHAPED GARAGE

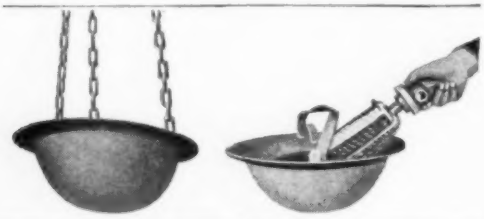
A two-car private garage in Chicago is enabled, by an ingenious patented arrangement, to accommodate both of its occupants with a single door of ordinary size, without any confusion or maneuvering. The garage building is L-shaped, and the door cuts across the corner of the "L" at a 45° angle. Either car may thus be driven straight into its particular side, or out again, without interfering with the other.



L-Shaped Garage for Two Cars, Which may be Driven In and Out through the Single Door without Interference: The Door is Set at a 45-Degree Angle across the Corner of the "L"

SOLDIER'S HELMET CONVERTED INTO LIGHTING FIXTURE

The "tin hat" presented by the grateful government to every returning fighting man is sometimes a cumbersome



The American Soldier's Helmet Makes a Presentable Lighting Fixture. The Silvered Reflector is being Inserted at the Right

souvenir. It can't be pasted in the family album, and it looks out of place on the parlor mantel. It does make a satisfactory indirect-lighting fixture, however, when equipped with several accessories now on the market. To effect the transformation, a silvered reflector is fitted inside the crown. The helmet is then inverted and suspended from the ceiling by three khaki-colored chains. The socket in the reflector will hold the conventional 75, 100, or 150-watt lamp. The equipment is made only for the American helmet.

CITY OF TWENTY THOUSAND HAS NO MAIL CARRIERS

An unusual city in many respects is Picher, Okla., which has now attained such magnitude that its post office serves between 17,000 and 20,000 persons. Its most peculiar feature is that this same postal service is performed without any letter carriers whatever. A clerk handles the incoming and outgoing mail, one takes care of money orders, two attend the general-delivery windows, and that is all the help the postmaster has. Furthermore, because of a migratory population, the post office really deals with about 50,000 persons a year. Picher is a mining town, and grew up suddenly. The whole city is built on leased land, and there are no sidewalks.

OIL-BURNING SUBMERSIBLES MAY ALTER BRITISH NAVY

Great Britain's new first sea lord is reported to be convinced that an oil-burning submersible battle cruiser is the warship of the future, and this belief may affect the empire's naval plans. The dreadnaught is thought to have passed the peak of its career, and now to be ready to take second place as a fighting ship.

PERMANENT MEMORIAL ARCH OVER BUSINESS STREET

Disdaining all such ephemeral, though glittering, "memorial" materials as canvas and plaster, the city of Wichita, Kan., has erected a massive and permanent arch of exceptional design for dedication to its soldiers. The big arch spans the city's main thoroughfare in the heart of the business district, and the substances of its sturdy construction are steel and brick, surfaced with stucco. The names of those who served appear on great tablets, forming the faces of the tower abutments of the arch, and across the top, following the curve of the span, is to be found a legend, reading "For the Liberty of the World."

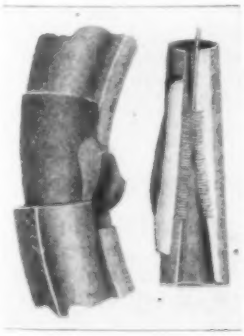
The Great Victory Memorial Arch That Spans the Main Business Street of Wichita, Kansas: The Span as Seen at the Left is Built of Steel and Brick, Stuccoed, and the Names of Soldiers Appear on Tablets in the End Towers, as at the Right

GERMANS CLAIM TO HAVE HAD WIRELESS-STEERED PLANE

A secret aeronautical development, hitherto guarded jealously by the German war office, has lately come to light through the disclosures of a prominent air-craft manufacturer. He asserts that in 1916 the army authorities asked him to design a very cheap airplane, powered by a very cheap engine, and steered in flight by wireless waves. "Shepherded" by one man in an ordinary airplane, a "flock" of these manless machines was to have been guided over the lines and into France. Once above the target, each little plane was to have dropped its load of explosives at the volition of the "shepherd." Such was the plan. The manufacturer claims that the planes were actually designed, and, had the government not insisted on making them itself, would have won the war for Germany. Not till the summer of 1918, he says, was the construction placed in his hands, with the result that quantity production was imminent when the armistice was signed.

HOOKS FASTEN BLOW-OUT BOOT AROUND INNER TUBE

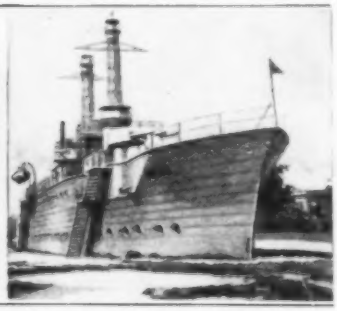
Something new in automobile accessories is a pneumatic-tire boot, made of strong fabric, that can be fastened around an inner tube by attaching the numerous small hooks which protrude from its edges to a thin strip of stiff rawhide. An inside flap prevents the hooks from damaging the tube, while another, on the outside, serves to keep the device in position when it is placed between an edge of the casing and the wheel rim.



NAVAL ELECTRICIANS TRAINED ON DRY-LAND BATTLESHIP

Strangely incongruous is the sight of a gigantic battleship, fully equipped and armed, standing in a field at the Hampton Roads Naval Training Station. Only a close examination will reveal that the craft is made of wood, and that its massive guns are incapable of being fired. The dry-land vessel is an exact copy of the U. S. S. "Mississippi," but has been christened the "Electrician," a name which aptly describes its use. Naval student electricians are trained and quartered on the extraordinary ship, which they board by means of regulation gangway ladders.

General View of the Dry-Land Battleship "Electrician," at Hampton Roads Naval Training Station



The Dangerous-Looking Guns to be Seen in the Picture at the Left cannot be Fired, as They, Like the Remainder of the Vessel, are Made of Wood. On the Right are Shown the Gangway Ladders Used for Boarding the Ship

NEW YORK STATE BOYS START MILITARY TRAINING

Boys of New York State from 16 to 18 years old, over 100,000 of them, have now been called to classes in all parts of the commonwealth by the State Military Training Commission. All the subjects that go into the making of good citizens will be taught them by officers of the regular army and national guard, as well as by physical instructors and teachers from colleges. Use of small arms, camping, first aid, and vocational direction are among the interesting studies included in the course.

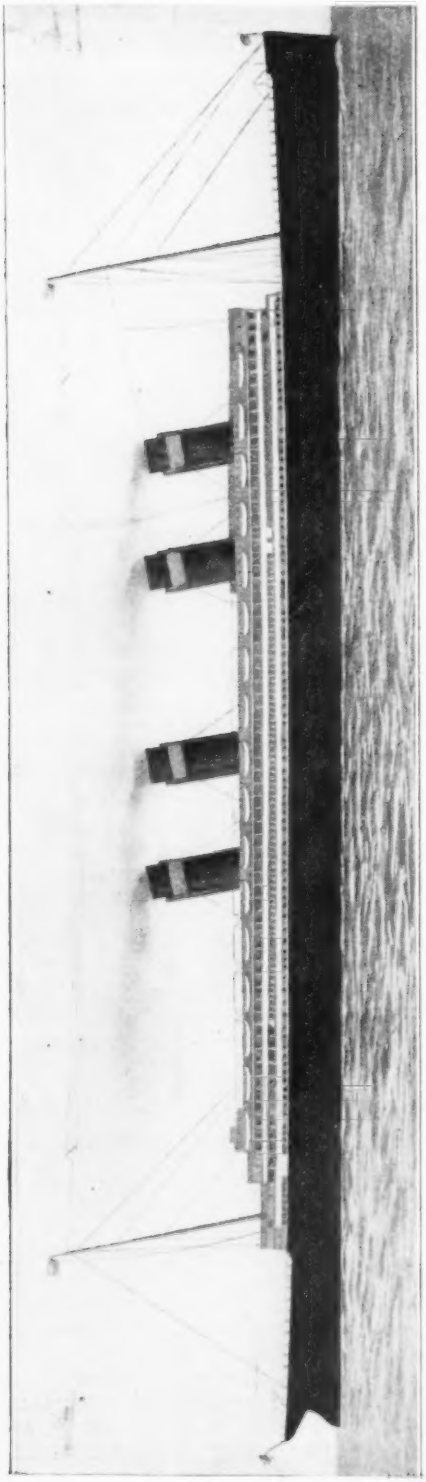


PHOTO BY WIDE WORLD PHOTOS

Type of 1,000-Foot Passenger Ship of Which Two are About to be Built for the Transatlantic Service by the United States Shipping Board: Each Ship Has 10 Decks, and is Equipped with Oil-Burning Engines for a Speed of 30 Miles an Hour, and at This Rate It is Calculated That They will Make the Trip across the Atlantic Ocean in Four Days

TWO GIANT TEN-DECK LINERS FOR AMERICAN SERVICE

Work is to be started immediately on the construction of two new American liners by the U. S. Shipping Board, each vessel to be 1,000 ft. long and to have 10 decks. They are intended for the transatlantic passenger service. Oil-burning power plants will be installed, calculated to drive the big ships at a speed of 30 miles an hour, which is expected to reduce the duration of the trip across the ocean to four days.

SEVENTY CENTURIES IS AGE OF SINAI INSCRIPTIONS

Older by thousands of years than the tablets of Moses, certain inscriptions in sandstone at the Magharah mines, on the Sinai Peninsula, have finally convinced modern investigators that the product of these ancient workings was not copper, as supposed, but turquoise. A considerable amount of quasi history has been built around the cuprous tradition, and American mining engineers, never satisfied with home-grown riches, have threaded the Arabian desert with eager plans for restoring the lost industry of old Egypt. Copper they found, to be sure, and signs of ancient workings; but an ore of such poverty that only the classification of copper as practically a precious metal could have warranted its reduction.

Without question the most marvelous product of those mines of antiquity is their inscriptions. The tablets, one of which measures 102 by 63 in., are carved in relief, with remarkable character, on sandstone, whose seemingly perishable nature has withstood the erosions of time since 4950 B. C.—some 3,700 years before Moses' day, and nearly 7,000 years before this 20th century. Many valuable specimens have been destroyed by vandalic prospecting, but those remaining are now in the care of the Cairo museum.

MOUNTAINEERING IN A TANK LATEST EUROPEAN SPORT

No thought of contributing to the gayety of peaceful pastimes cheered the designer of the military tank. But pleasure is resourceful and daring, and now, in the French Alpine country, whole busloads of excited passengers are to be seen scaling mountain trails hitherto inaccessible to any vehicle, mounted on the extemporized seats of a regular army tank.

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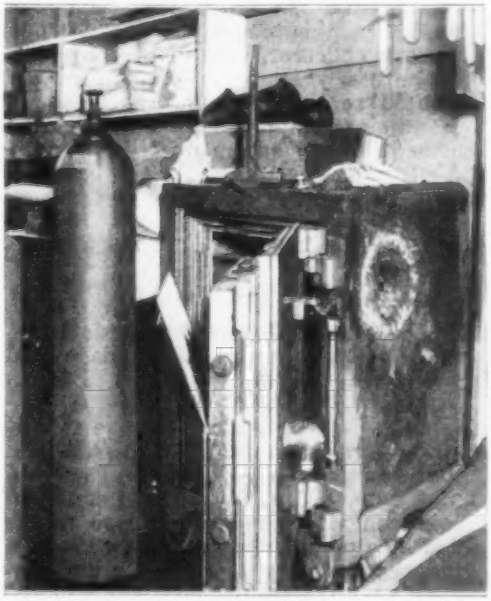
Army Tank Fitted with Seats for Ten Passengers, Now being Used for Mountain Climbing in the Alpine Districts of Eastern France: Paths Hitherto Impassable are Thus Made Available, and Mountain Hotels are Using Them for Busses

The smaller machines of this type are readily equipped with seats, either lengthwise or tranverse, for a total of ten passengers, who enjoy all the thrills of amusement-park ingenuity, with the advantage of progress toward their destination.

YEGGMEN BURN HOLE IN SAFE WITH ACETYLENE TORCH

Arriving at his office on a recent Monday morning, a Cincinnati business man was greeted by two open safes, the locks shattered from within by explosives, one side of each still hot to the touch and pierced by a yawning hole. By the larger safe, which on Saturday night had been locked upon many thousands of dollars, now stood two emptied gas tanks, each four feet high, and telling the story of the yeggmen's methods. Working for many hours, they had burned a hole through the side of each safe, then exploded a charge of nitroglycerin under each lock, and swung open the heavy doors. The smaller safe was rifled, but the many thousand dollars in the larger were found intact in an interior strong box whose lining of manganese steel had resisted the flames.



Having Burned a Hole through the Side with Acetylene Gas, the Robbers Found It Easy to Shatter the Time Lock and Open the Door

ANCIENT AND COSTLY ARMOR DISPLAYED IN MUSEUM

Fashioned nearly four centuries ago, an elaborately carved and heavily gilded suit of armor now on exhibition in an eastern museum is declared to be the most valuable production of its kind in existence. It was made

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In the Sixteenth Century This Beautiful Carved and Gilded Armor was Worn by a French Warrior. It is Now to be Seen in an Eastern Museum

for a French knight in 1527, and was brought to this country by a famous American collector, who discovered it in Paris several years ago. Recently it was presented to the museum. Included in the outfit are trappings for a horse, embellished in the same manner as the suit, and affording protection for the beast as well as its rider.

AIR CRAFT TO LINK NORTHERN CANADA WITH SOUTHERN PORTS

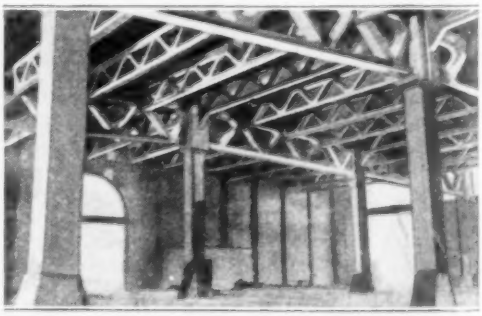
In the projected commercial development of that virgin part of Canada which lies between Hudson Bay and the coast of Labrador the airplane and the dirigible, it is now learned, are to play the stellar rôles by carrying freight to and from the outposts of industry. The cost of such a service will be considerable, yet small in comparison with the present rate of $2 and more a pound, necessitated by the use of canoes and dog teams. During the coming year the main operations will be carried on in the region which lies north of the mouth of the St. Lawrence River. Already the scheme is arousing much interest in the city of Quebec, which will, of course, profit directly by any developments.

FANCY GOLDFISH MARKED IN RED, WHITE, AND BLUE

The collecting and breeding of fancy goldfish by the many people who make it their "hobby" has never produced a more brilliant result than "Miss Liberty," noted during the last few months as the fish whose progeny are being sold to raise funds for a city aquarium. "Miss Liberty" numbers among her immediate ancestors a Chinese moor-black, a red-scaled Japanese, and a brown transparent-scaled Japanese goldfish, and accounts in this way for her own strange appearance. The under body is red, the back white, while the fantastic markings on fins and body are blue.

PRECAST CONCRETE ROOF FITS TOGETHER LIKE PUZZLE

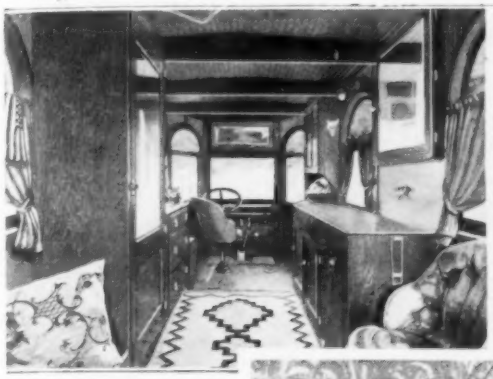
Finding it impossible to build the superstructure of Pier No. 6 at Cristobal of steel as planned, the authorities of the Canal Zone caused it to be redesigned as a concrete shed. An unusual precast-roof construction is the result. The heavy, monolithic supporting columns were cast in place, but the girders and roofing tiles were all cast elsewhere. Slots in the supporting columns received the main girders, while slots in these received the secondary girders. As a consequence the only metal on the pier is



The Roof of This Great Pier in the Panama Canal Zone is Seen to Consist of Concrete Girders Which Fit into Slots in the Concrete Columns. The Whole is Covered by Concrete Tiles

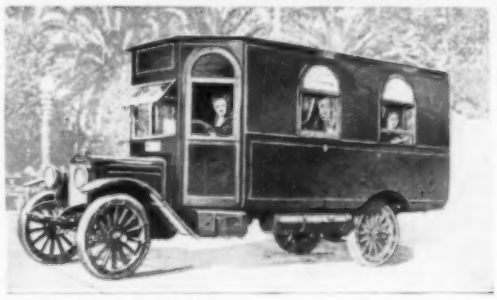
found in certain protective buttresses, in the reinforcing rods, and in the rolling doors.

COMFORTABLE HOME IS BUILT ON TRUCK CHASSIS



Looking Forward in the Motor Truck's Luxurious "Living Room," toward the Driver's Swivel Chair

The Comfortable Couch Bed in the Rear and the Ample Cupboards and Dressers Are Visible Here



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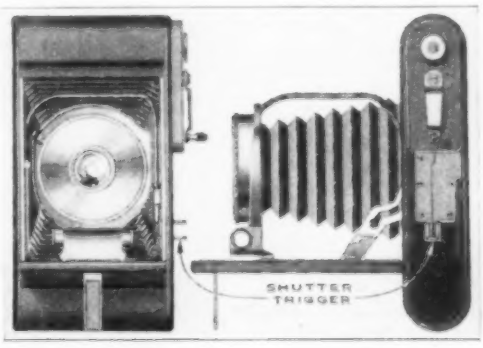
The External Appearance of the Traveling Home, Showing How the Living Apartment is Substitued for a Motor-Truck Body: The Entrance Doors Are at the Forward Corners, and the Body Is Metal-Covered

The idea of substituting a small living apartment for the conventional automobile body has been worked out in many ways, but most of them are merely makeshifts, intended to take the rough edges from camp life. A California designer, however, has evolved a nomadic dwelling that is not only comfortable but even luxurious. An oak frame, 14 ft. 5 in. long and 7 ft. 1 in. wide, covered outside with metal and inside with wallboard, is mounted on a 1½-ton chassis. It provides a living room of good size, with a cross-beamed ceiling and doors at the front corners. A clever arrangement of cabinets transforms the apartment into bedroom or kitchen at will. A tire pump is used to supply water for the lavatory and fuel for the cookstove. Tanks and cupboards carry all necessary supplies, permitting an indefinite stay wherever the fancy of the occupants may dictate.

REPEATING CAMERA TAKES NO "DOUBLES" OR "BLANKS"

Consecutive exposures may be made very rapidly with a new hand camera, the patent for which is assigned to a large manufacturer. The film is wound with a crank after each exposure, exactly the right length of winding being assured by an automatic stop, which advances one step after each operation, to compensate for the growing diameter of the film spool. The shutter trigger is located on the side of the case, and connected with the winding mechanism by a sliding plate, which locks it after an exposure, but releases it again as soon as the exposed film has been wound. The shutter trigger then, in turn, locks the winding mechanism until another exposure has been made.



Front and Side Views, Respectively, of the New Repeating Camera: The Winding Crank and the Small Compartment Which Contains Its Mechanism, as Well as the Shutter Trigger, are Seen in Both Views

FORTY CHESS PLAYERS PITTED AGAINST EXPERT AT GAME

Chess ordinarily requires the utmost mental concentration on the part of the players, but this rule does not apply in the case of an expert who appeared at a tournament held recently in England. Forty skilled opponents, seated at as many boards, were engaged at one time by this master of the game, who went from problem to problem with remarkable speed, studying each but a moment before deciding upon a strategic move that left the antagonist in a quandary. Only lack of room prevented the expert from playing 50 persons, as had been planned.

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Dividing His Attention between 40 Chessboards, and a Like Number of Players, the Expert in the Center of the Picture Proved Himself Master of All the Problems Presented

PLANS MADE FOR AIRPLANE FLIGHT TO SOUTH POLE

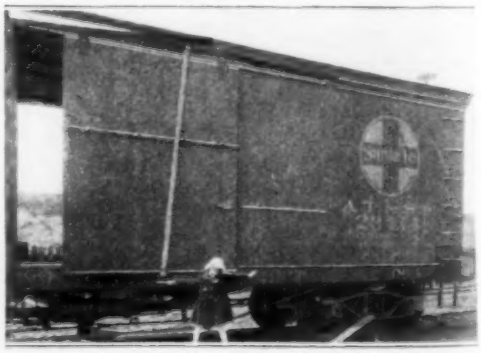
Plans are formulating fast for the airplane dash to the South Pole which is to feature the five-year cruise of the British Imperial Antarctic Expedition, scheduled to start in June, 1920. First will be established a land base about 750 miles north of the pole. Here the airplane will be loaded with a sled, for use in case the plane breaks down, with provisions, and with every drop of gasoline the tanks will carry. Aside from these plans it is announced that applications from scientists are now invited, as it is desired to "sign up" the full party of 51 men as quickly as possible. Among those whose applications have been rejected are many women and a number of boy scouts.

CONCRETE MADE WITH CINDERS USED TO BUILD HOUSES

Urgently in need of dwellings to shelter workmen employed in a chemical plant near Wilmington, Del., government engineers constructed a village of 75 inexpensive fireproof houses in a very short time and in a novel way by utilizing cinders removed from the factory furnaces. This material was mixed with cement and hydrated lime, producing concrete of unusual strength. Movable steel molds were used in erecting most of the buildings, these being found more economical than ordinary wooden forms, as they could be transferred to new positions as quickly as the material set. Stones were imbedded in the walls, reducing the cost of the structures by displacing a large quantity of concrete. Finished with a coating of white stucco, the buildings presented an attractive appearance.

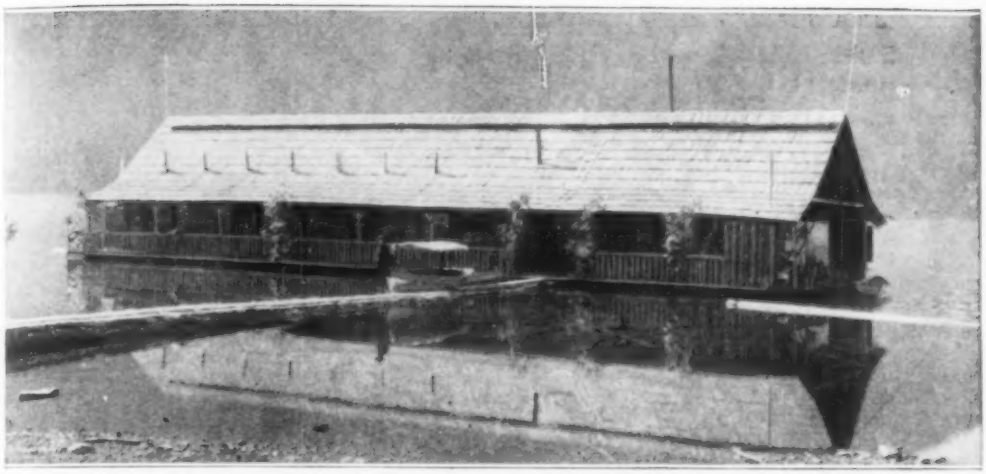
FREIGHT-CAR DOOR IS OPENED EASILY BY NEW ATTACHMENT

Opening freight-car doors of the usual sliding type is generally a serious task, demanding tools and muscle. An attachment for such doors, recently devised by a railroad man, so far relieves this condition, however, that a child is able successfully to operate it. The device



BY COURTESY OF THE SANTA FE MAGAZINE

Freight-Car Door Opener, an Attachment Which Makes the Usually Difficult Task Easy, Even for a Child



Floating Hotel on Great Central Lake, British Columbia: Fishermen and Hunters Who Patronize the House Boat Find It an Ideal Temporary Home, as the Proprietor Moves the Craft to Any Location That Offers the Best Sport

consists simply of an iron bar pivoted above the door, with a handle on its lower end. The point where the bar engages the door in opening or closing it, gives the user a leverage that overcomes the most stubborn resistance.

ALUMINUM STAMP MOISTENER HAS PERFORATED CAP

For moistening gummed stamps, envelope flaps, and labels, a simple device, made entirely of aluminum, has been placed on the market. It consists of a small cylindrical water container, fitted with a finely perforated cap. When the container is turned upside down and the cap applied to a smooth surface, liquid flows through the tiny holes. The contrivance is intended to serve instead of moist sponges and other makeshifts now in common use.

SPORTSMEN'S HOTEL FLOATS ON CANADIAN LAKE

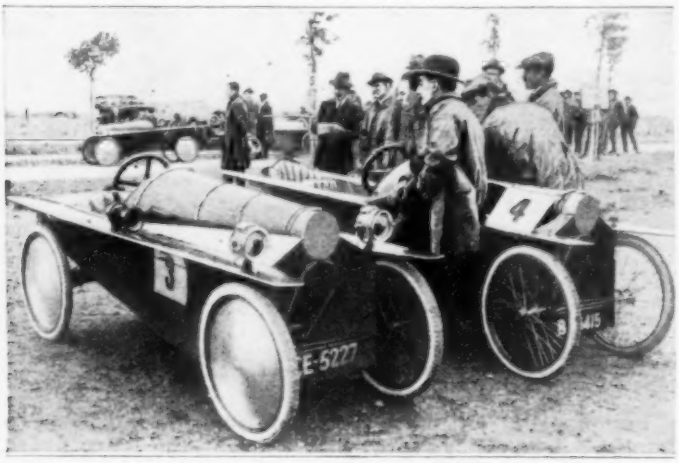
Unable to purchase a convenient site on shore, a Canadian operates a floating hotel on Great Central Lake, B. C., a body of water noted as a fishing and hunting resort, and wins the approbation of patrons by moving the quarters to any spot that affords the best sport. There are 10 guest rooms on board the big house boat, each capable of accommodating two persons; a large dining room, and a kitchen. Around the structure is a wide veranda, from which perch can be taken with a hook and line, if the craft is advantageously moored. Trout are plentiful, but require a little more effort to capture. Wild game abounds in the woods which surround the lake. During the winter, when ice covers the water, the proprietor of the hotel becomes a fur trapper.

FOREST RANGERS COLLECT PLANT SPECIMENS

Equipped with small herbariums, the forest rangers on their tours of one western district will henceforth gather specimens of all plant species encountered. Turned in at supervisors' headquarters, these will be mounted and described for public reference. Stockmen using the national forest ranges may become familiar in this way with all the forage plants in the region, and will be able to guide their grazing herds away from areas infested with poisonous weeds.

ENGLISH LIGHT-AUTO CRAZE BRINGS OUT ODD MODELS

Whether the reason be psychological or economical, there is no doubt that the ultra-light auto is finding a warm welcome just now in England—the lighter the warmer, it would seem. To offset the inconspicuousness of the very small car, there is considerable departure from conventional lines in the models displayed, whose designs are more easily pictured than described.



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Some Models of Very Light Cars Now Popular in England, Indicating a Tendency to Gain by Oddity What Conspicuousness is Lost by Diminutive Dimensions

CHAIR OF DIPLOMACY PLANNED FOR PRINCETON UNIVERSITY

Significant indications of America's expanding world interests are found in several details of the proposed $14,000,000 endowment program of Princeton University. Of first interest is the plan for the establishment of a chair of diplomacy, which, it is believed, will increase the number of men willing and qualified to give intelligent, disinterested service as America's representatives in foreign countries. Important also is the proposal to create a department of South American history and institutions, which should prove itself invaluable in fostering sympathetic coöperation between the two countries.

¶"The World War" is now the official American designation of the recent international disagreement, instructions to that effect having been issued to the War Department by the President.

UNUSUAL BOILER CORROSION RESULTS FROM COKE FUEL

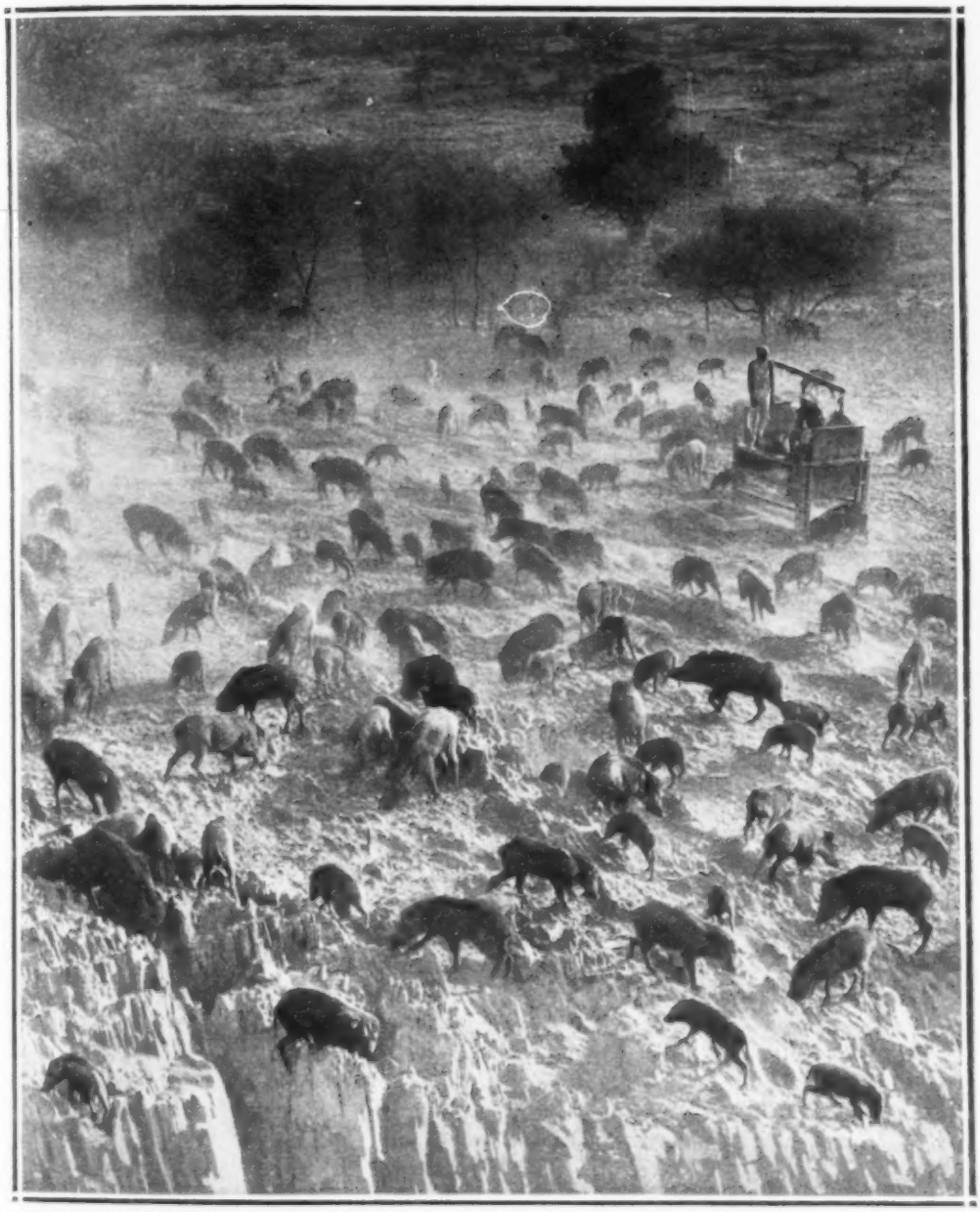
A peculiar chemical action, resulting in the corrosion of all parts of a boiler exposed to the fuel gases, was discovered in a recent inspection of an English steam plant using coke fuel. In places the boiler plates were reduced from 7/16 to 3/32 in. thick, and were coated with a pale-reddish scale, which was found to consist of dehydrated sulphate of iron and red oxide of iron. Further research brought out the fact that sulphur-dioxide gas released from burning coke, passed over heated red oxide of iron, is converted into sulphur trioxide, which becomes sulphuric acid when mixed with water. Allowing the boiler to cool had condensed moisture in the hygroscopic iron oxide, and the acid formed had reacted upon the iron of the plates.

SHOES OF RECORD SIZE COVER FEET OF CIRCUS WOMAN

The soaring price of shoes interests many million people; but to one woman nature has made it a matter of most particular concern. So large that she is exhibited by a circus as a side-show freak, her feet require for covering shoes of unusual proportions. Each is 19½ in. long and 8½ in. wide, and contains almost three times as much leather as the ordinary man's shoe. In appearance they resemble the latter, however, no attempt being made at fashion.

The Shoes in the Center, of Ordinary Size, are Dwarfed by the Giants on Right and Left, Which Are Nearly 20 Inches Long and are Worn by a Circus Woman

CAMERA CATCHES BOARS SWARMING FROM JUNGLE



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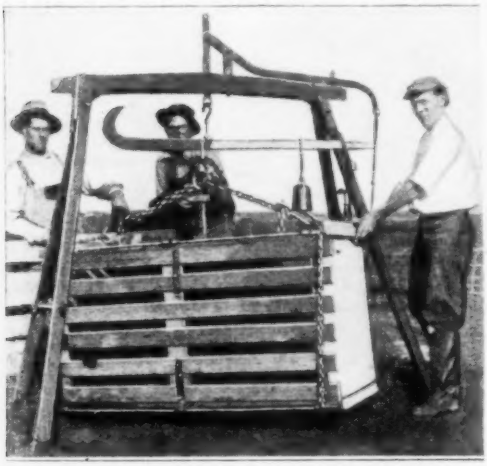
ALTHOUGH tigers, leopards, wolves, boars, and elephants abound in various parts of India, an Indian relative of the humble American pig is famed among sportsmen everywhere as furnishing the most exciting sport in the world. The wild boar of that country stands 30 to 40 in. high at the shoulder, and distinguishes himself as a swift runner and a desperate fighter when at bay. The sport of hunting him on horseback with light bamboo spears consequently is replete with dangers and thrills, and calls for such good horsemanship and bravery that it has frequently received the support of the military authorities. The sportsmen usually employ long lines of "beaters," under the command of a mounted native, to chase their quarry from its jungle cover; but in the photograph above hundreds of the animals have been caught by an adventuring camera man as they swarmed from hiding to enjoy themselves at a salt "lick." Their craving for the health-bringing substance thus frees them periodically from their fear of man. Two natives at the right are safely perched on a trap in which they catch an occasional animal for slaughter.

PORTABLE SCALE EMPLOYED FOR WEIGHING HOGS

By suspending a crate from the hook of a portable scale, designed originally



Weighing Hogs on a Portable Scale: One Side of the Crate is Hinged So That It can be Dropped to Admit the Animals

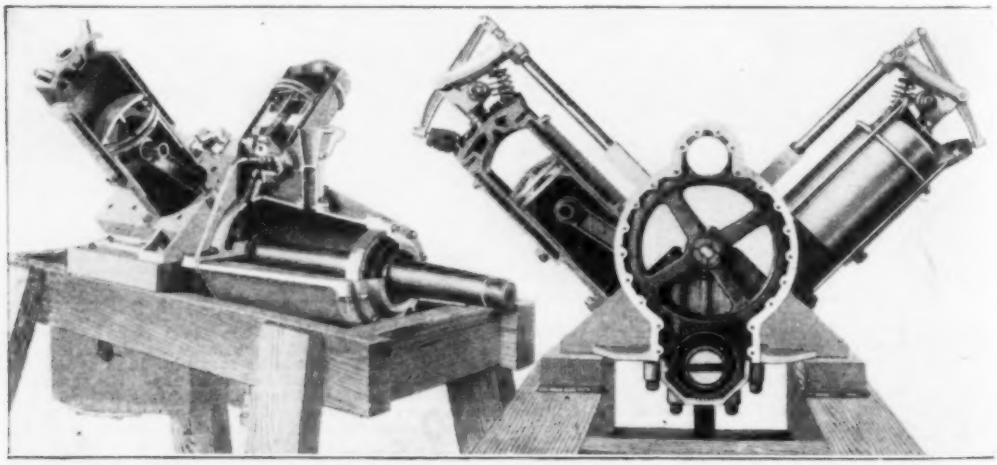
for use in cotton fields and on docks, the device is rendered suitable for weighing hogs, and has been found a convenience on stock farms where large numbers of these animals are raised. The scale beam is hung on a wooden bar that is supported at either end by two spread legs. This assembly can be carried by two men. Chains are employed to attach the crate, which is constructed so that one of its sides can be dropped to permit the entrance of a hog.

DANISH MACHINE PRESERVES CREAM FOR EXPORTATION

Cream prepared with a device recently patented in Denmark remains fresh for a long period, and plans are being made to manufacture this product in quantity for exportation from the Scandinavian country, instead of ordinary condensed milk. While a detailed description is not available, it has been revealed that the contrivance atomizes the small particles of fat contained in cream, dividing these into still more minute portions. Material is forced through the machine under high pressure. Several similar devices proved to be costly failures when put into actual operation.

GAS-ENGINE THEORY LEARNED FROM DISSECTED MODELS

"Dissected" motors are now found useful in expediting the instruction of the army's student airmen in the theory and operation of internal-combustion engines. With a hacksaw enough metal is cut away from these engines to permit the student's inspection of every part. Thus each cylinder is examined in cross section, while the pistons move up and down, and the valves open and close. In studying the oil, gasoline, and water circulation, the student finds their paths colored respectively in red, blue, and white. Convenience in handling these classroom models is obtained by attaching each to its wooden base with stout hinges.



These Two Cut-Away Internal-Combustion Engines have Proved Valuable Aids in the Instruction of Student Airmen. The Oiling System and the Mounting of the Crankshaft are Clearly Understood from the Model at the Left, While at the Right is Demonstrated the Action of Valves and Pistons. The Hinged Bases, Shown Most Clearly at the Right, Make Handling by the Instructor an Easy Matter

One-Story Building of One-Thickness Tile, Built to House a Fire Sale for a Department Store Which had Lost Its Own Building: It Was in an Oil Town, and No Other Space Was Available. After the Sale of a Few Days the Building was Torn Down

CONSTRUCT SPECIAL BUILDING FOR FEW DAYS' FIRE SALE

The enterprise and resourcefulness characteristic of the Southwest's mushroom oil towns is not confined to their chief industry. A big department store in a Texas gusher community burned out the other day. Obviously a fire sale was the next thing in order; but the damaged store was unfit for it, and a swarm of oil men had preëmpted all the other space in town. On a vacant lot a local contractor, unembarrassed by the scarcity of material and help, then undertook to erect a one-story fireproof building in 50 working hours. In that time he actually delivered a remarkable finished structure of tile, one layer thick, 50 by 100 ft. In this was held so successful a sale that in a few days the building, empty once more, was torn down.

MOVIE DIRECTOR IN AIRPLANE FINDS LOCATIONS EASILY

An enterprising movie director attached to a California studio used a seaplane the other day as a quick and novel means of inspecting a wrecked Chinese junk. The vessel was found to fit its name too well for picture work; but the movie man declares he has found the ideal way of hunting locations, and has some aerial snapshots to prove it.

NO PAGES TO TURN WITH USE OF MOTOR-MOVED MUSIC ROLL

Stopping to turn a stubborn page, the musician not infrequently finds the effect of his performance spoiled by an awkward pause. From France now comes an invention which will obviate this annoyance. The music is printed, not on pages, but on a long strip, as is the practice with music for the player piano.

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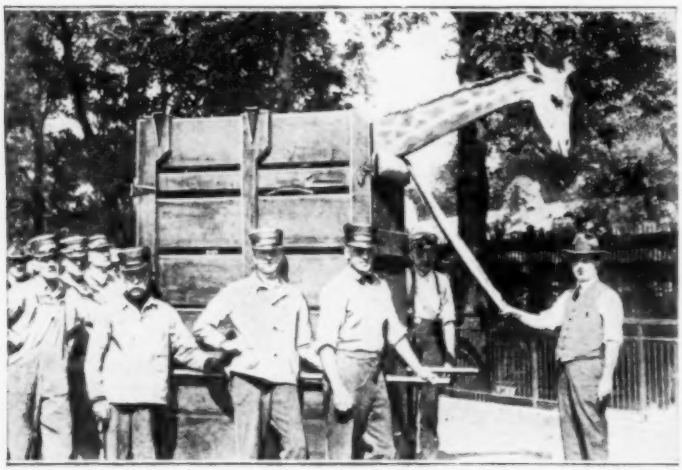
The Little Lever Controls the Speed at Which the Motor-Driven Rolls Bear the Music before the Eyes of the Musician

Placed on motor-driven rolls, the music passes before the eyes of the player at any desired speed. The controlling lever is conveniently placed at one side.

STUBBORN GIRAFFE CARRIED TO WINTER HOME

When it comes to temperament there's not an inhabitant of the Chicago Zoo can hold a candle to "Mollie" the giraffe. All summer long she walks contentedly about her outdoor pen. But with the coming of winter, and the danger that "Mollie" may develop the pneumonia to which she is so susceptible, she suddenly remembers her sex and grows unreasonable. The keepers coax, but she won't budge an inch toward her winter quarters, just 50 yd. away. Each year the keepers try, but yearly they fail. So they have now built a wooden crate with hand grips along the side, and in this palanquin bear the stubborn lady to her winter home. All sharp edges are "upholstered" to prevent injury to the animal.



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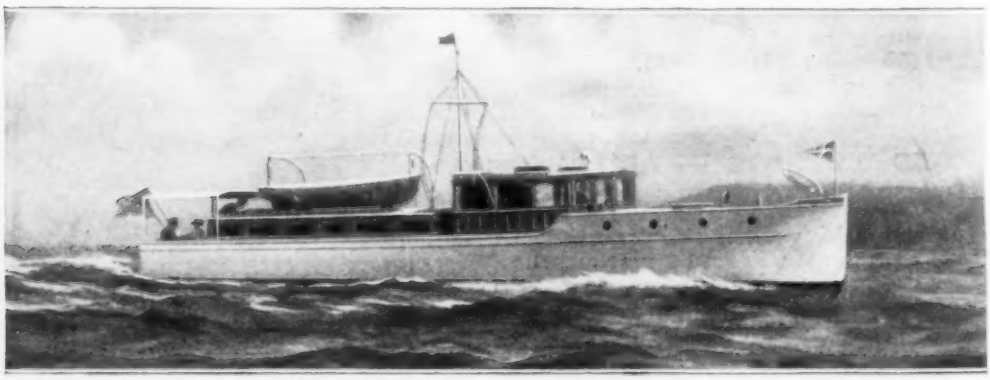
Like an Oriental Lady in Her Palanquin, "Mollie" the Giraffe is Borne Each Year from Her Outdoor Pen to Her Winter Quarters. The Rails along the Sides of the Crate Provide Handholds for a Dozen Keepers

MOTORBOAT FOR COMMUTERS RUNS AT AUTO SPEED

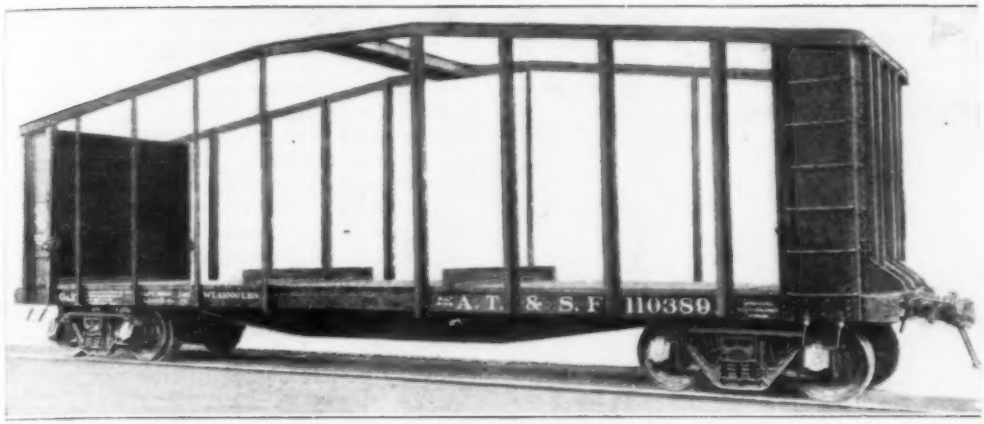
Highway speed and more than limousine comfort are afforded those in a position to travel from their country homes to their offices by water, in a new motor cruiser designed with that purpose in view. With its 52-ft. length, its roomy deckhouse forward, comfortable cockpit at the stern, and raised cabin between, this luxurious yacht is stanch enough for the Florida trip in the winter, and for daily commuting the rest of the year. Its two eight-cylinder engines, with a total of 400 hp., give it a speed better than 27 miles an hour, allowing the water commuter at least a 30-mile radius from his business, and increasing the pleasures of vacation cruising in southern waters.

RAILROAD TIES, SCARCER NOW, TRAVEL IN SPECIAL CARS

Maintenance of railroad ties no longer means merely a little casual lumbering along the right of way. Long hauls are becoming the rule rather than the exception for loads of hewn ties, and one west-



High-Speed Motor Cruiser Which can be Used for Commuting between Country Home and Business, as It Runs at 27 Miles an Hour: Its Forward Deckhouse, Raised Cabin, and Roomy Cockpit Give It Unusual Comfort

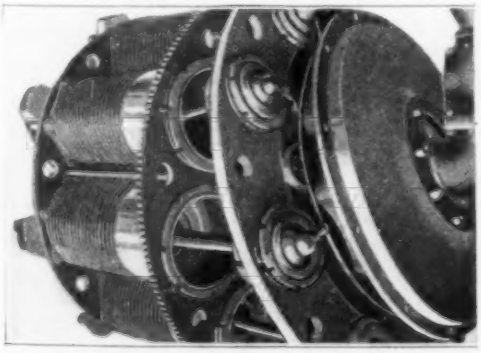


Special Car for Railroad Ties: Only the Ends are Inclosed, Using One-Fourth-Inch Iron Plate for the Purpose, and the Side Posts and Top Bars Are of Structural Steel. The Car is 40 Feet Long Inside and Nearly 14 Feet High in the Center

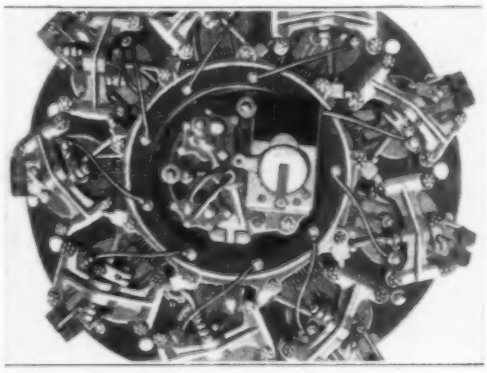
ern road is hauling them in a special car, built for that purpose. It has a platform length of 40 ft., with 12 steel posts at each side, surmounted by longitudinal channel irons, a heavy beam connecting them across the top. The ends are inclosed in ¼-in. iron plates. Four wooden-tie supports, capped with channel iron, project above the floor of the car near center and ends. The car's total height is slightly over 11 ft. 8 in. at the ends and 13 ft. 11 in. at the center.

TILTED DISK REPLACES CRANKSHAFT IN ROTARY MOTOR

A nine-cylinder rotary motor with connecting rods working in ball-and-socket joints is Italy's latest contribution to the cause of aviation. The cylinders are held side by side by a geared ring which presses upon their flanged ends. The connecting rods terminate in balls which are held by sockets in an oblique, or tilted, disk. At the opposite end of the cylinders are the magnetos, spark plugs, and the usual valves. In operation, the propeller shaft is driven from the geared ring mentioned above. Remarkable accessibility for repairs is gained by the original construction, as the whole thing can be dismounted, pistons taken out, etc., without removing the engine from its bed. Between 300 and 450 hp. is developed at 1,500 revolutions per minute.



This Unconventional Engine Is of Italian Design and is Meant for Airplane Use. The Connecting Rods Terminate in Ball-and-Socket Joints



PHOTOS BY COURTESY OF THE AEROPLANE

The Accessibility of Valves, Magneto, and Wiring Is Evident from This View of the Odd Engine. It should be Manufactured Cheaply, as It Is a Lathe Job

TELEPHONE LINKS LIGHTHOUSE WITH DISTANT MAINLAND

Novelists and scenario writers have done their work so well that the lighthouse now stands in many minds as the very symbol of loneliness and isolation. In truth, many are placed in lonely spots; and none lonelier than Tillamook Rock, off the coast of Oregon. Here, for three

decades, the keepers have heard the quiet broken only by the wash of the waves or the occasional hail of the supply boat. Shortly, however, the telephone is to

Up the Steep Side of Lonely Tillamook Rock the Derrick is Pulling the Telephone Cable Which Is to Link the Lighthouse with an Extensive Coastal System

break the long spell of silence. Under the supervision of the coast-guard service, a cable is being laid, and will soon link Tillamook with a general system which is to connect all lighthouses, coast-guard stations, coast-defense stations, and coast cities.

PLANE "GASSED" BY SERVICE STATION IN CITY STREET

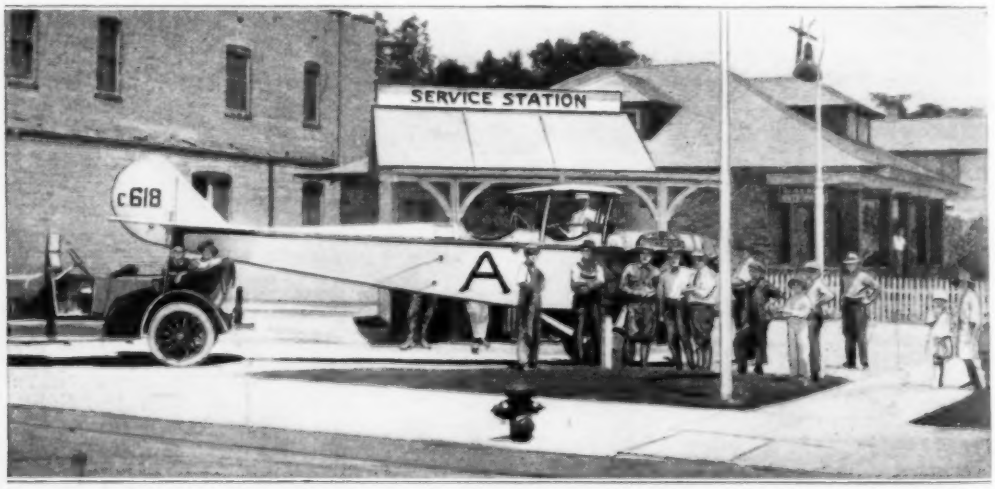
An automobile service station in a western city is now distinguished as the first of its kind to supply gasoline and oil to an airplane. With the tail resting on the tonneau of an automobile, the plane was rolled through the city streets, around corners, and up to the gasoline pump. The wings, of course, had been removed.

SEND AUTOMATIC FOG SIGNALS BY LIGHTHOUSE WIRELESS

A simple wireless receiving set and direction finder on shipboard, and an automatic radio transmitter for lighthouse equipment, comprise the elements of a new fog-signaling system now under test. The success of the experimental installation in one lighthouse tender and three Chesapeake Bay lighthouses will be followed by the equipment of a number of Atlantic-coast points under the new plan. Signals so transmitted are not only positively reliable, but are independent of the visibility of the signal light.

PAPER PRINTED IN SHORTHAND FOR CANADIAN INDIANS

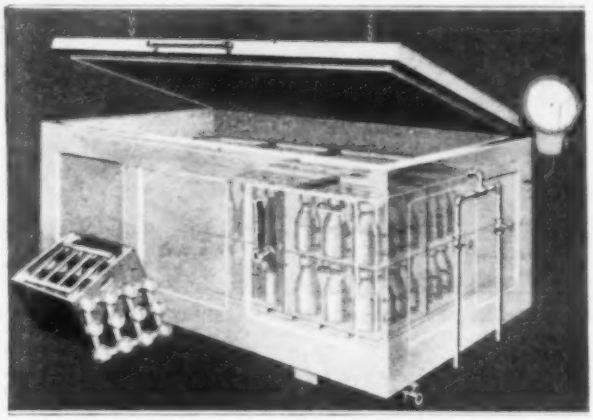
As suggested by its name, the "Kamloops Wawa," published in Kamloops, B. C., is one of the queerest newspapers in the world. Some years ago a priest laboring among the Indians of the Fraser River Valley adapted a shorthand system to the native language. Its reception was cordial; hundreds of Indians studied and mastered it. The priest was encouraged to translate part of the Gospels into his sign language; then to issue daily mimeographed bulletins. These were read so eagerly that he had type cast; and, using the presses of a journal in Kamloops, now prints a shorthand "weekly" that boasts a circulation of 3,500, or more. The considerable advertising carried in every issue indicates operation on a sound business basis.



The Aerial Taxi Service Maintained by a Former Army Airman Recently Advertised Itself When the Plane was Hauled through the City Streets to This Automobile Service Station

BOTTLED-MILK PASTEURIZER HAS TRIPLE USE

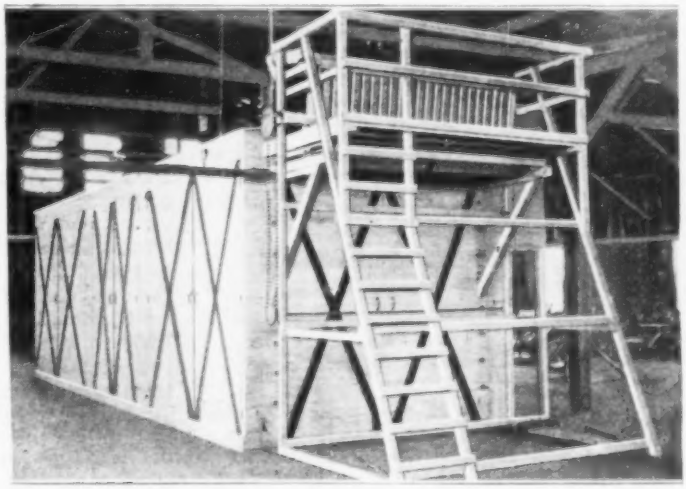
Able to function as sterilizer, pasteurizer, and refrigerator, a new piece of dairy equipment is rapidly finding favor with milk distributors seeking efficiency and economy. Each unit, of which there may be a dozen in a plant, resembles a large box, lidded and amply insulated against loss and absorption of heat. When it is desired to sterilize bottles and milk-handling tools they are placed in the box and bathed in live steam. However, the box is intended primarily as a pasteurizer; that is, is intended to check fermentation in the milk. For this purpose, bottles filled with the raw product are capped with water-tight cuplike covers and stacked in the box. The lid is lowered and locked and steam gradually admitted. The steam being turned off about an hour later, the milk is kept at the same high temperature for another 30 minutes by the heat-retaining properties of the insulation. Finally, to cool the milk, the lid is raised while cool water flows in at the bottom. Rising, this water lifts a blanket of warm water which has condensed from the steam, thus preventing bottle breakage. As the process is now completed the lid is lowered and the milk kept cool until required.



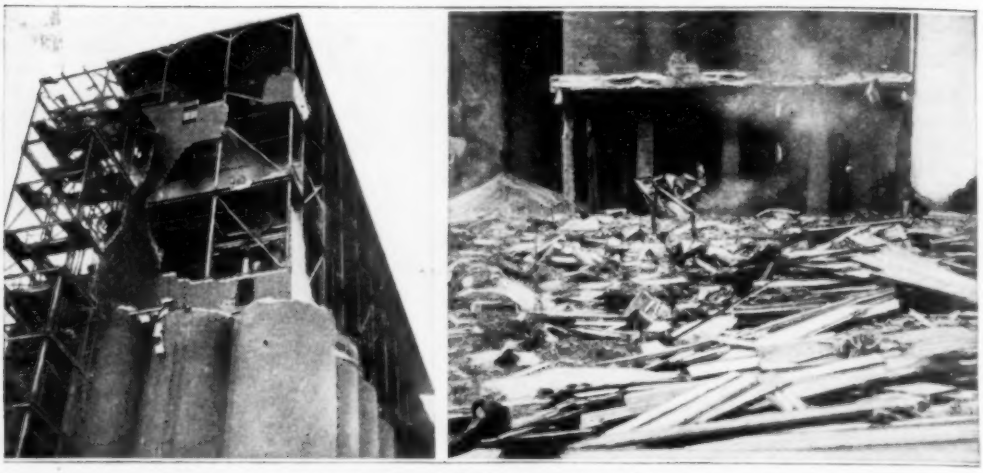
In This "X-Ray View" the New Piece of Dairy Equipment is Shown with the Lid Lifted and the Milk, Bottled and Crated, in Position for Pasteurization. The Covers at the Left Exclude Steam and Water during the Process

BIG FRUIT-DRYING MACHINE SAVES WASTED PRODUCTS

In the fruit-growing district of Washington State, an inventor familiar with the great waste of unmarketable fruit and vegetables has evolved a dehydrating machine which promises to conserve at least a portion of this valuable food product. The machine is large, intended for factory operation, and performs its functions automatically. It first slices or cubes the fruit, and then spreads it on slightly inclined trays, arranged one above the other in a wood housing. Independent steam control for each tray permits adjustment for different varieties. The rising of the heated air is declared to produce a vacuum effect, which extracts the moisture in a short time, without affecting the cell structure. The product, when cooked, regains its original form and flavor, as the dehydrating process removes from it nothing but water, which the cooking process replaces.



Big Fruit and Vegetable-Dehydrating Machine, Which Cuts the Material into Cubes or Slices and Spreads Them on Inclined Trays Contained in the Frame Housing: Dry Air Rising from Steam Coils Extracts the Moisture



Grain-Elevator Explosion, Caused by Ignition of Grain Dust: The Violence of the Blast is Indicated by the Wrecked Walls in the Left-Hand Picture, the Débris That Littered the Ground Afterward being Seen at the Right

COMBINED SCRUBBING MACHINE AND FLOOR POLISHER

Interchangeable brushes and pads supplied with a new light-weight scrubbing machine, intended for household use, make it possible to convert the device into a hardwood-floor polisher within a few seconds. The attachments, circular in shape, are designed to be rotated by a motor, which is mounted on two rubber-tired wheels. A handle of convenient length is provided for pushing the contrivance. Fifty feet of insulated cable, for connecting the appliance with a light socket, is part of the equipment. A switch is located on the handle.

Floors can be Scrubbed or Polished with This Electrically Operated Home-Use Machine

As America's share in the restoration of the Belgian University of Louvain, it is planned to raise by popular subscription the sum of $500,000 for the erection and equipment of a library.

MILLIONS LOST IN EXPLOSION COSTING THIRTEEN LIVES

The violent explosibility of grain dust, many times demonstrated, was responsible for another tragedy a few weeks ago, when a mammoth grain elevator at Kansas City blew up with terrific force. A total of 13 employes were either killed outright by the blast, or died within a few hours. The elevator contained about 1,000,000 bu. of grain at the time of the explosion, and the loss directly and by the subsequent fire was estimated at three and a half million dollars.

GIANT FOREST FIRE BEATEN BY THOUSAND VOLUNTEERS

A forest fire that threatened, in 13 days of unimpeded destruction, to consume the whole of Angeles National Forest, in southern California, was finally brought under control by the desperate efforts of hundreds of volunteers. The unceremonious drafting of curiosity seekers swelled the ranks of the fighters until, in one district alone, around Pomona, more than 1,000 were working day and night to stay the onrushing flames. The kindling of tremendous back fires at critical points, guided by airplane inspection, succeeded in holding the fires within the originating area. Many resorts and summer homes were menaced, but only a few cabins were lost. As a result of the fire, the city waterworks of Pasadena is to be protected by a giant firebreak, which will be constructed immediately by the rangers of the U. S. Forest Service.

SENDING WIRELESS MESSAGES BY MACHINE

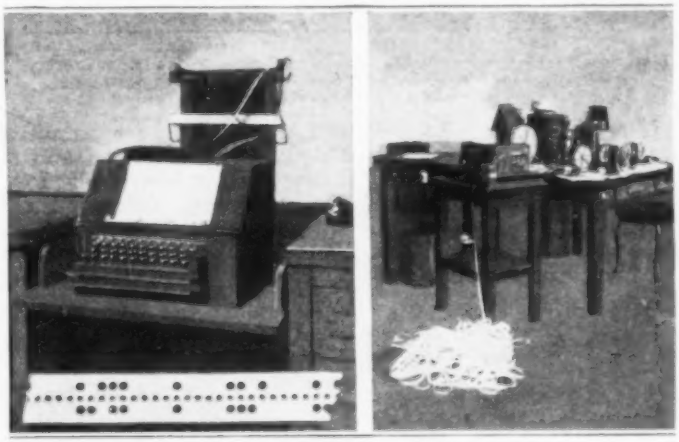
By SAMUEL W. BEACH

WHILE the submarine telegraph cables will probably for a long time continue to hold the palm for both speed, accuracy, and dependability in the matter of communication between continents, the wireless is now, even though admittedly still open to improvements, rapidly encroaching upon its field.

With "static" interference practically eliminated as a cause of trouble, as recently explained in this magazine, one of the remaining problems in wireless communication was, until a short time ago, a means of transmitting the messages at great speed. With the apparatus shown in the accompanying pictures, which is now in constant use in radio communication between the United States and Europe, the problem seems to have found a practical solution. The dots and dashes it carves out are perfect, which means a lot to the busy receiving operator across the water. If, however, the latter fails to read any of the signals, he has but to step across to his "sending" station with a rush message, which is transmitted instantly, and the office thus notified stops its machine, backs it up to the point indicated, and starts it going again.

Anybody who can peck at a typewriter can keep two or three sending stations working. The messages to be sent are punched into a tape exactly as one manipulates a typewriter excepting, of course, that the letters appear on the tape as a series of holes. The sending machine is so arranged that, as the tape unwinds, it sends out dots and dashes over the radio in conformity with the perforations. This is accomplished by passing the tape between upper and lower contact points which, when coming together, cause an action analogous to the closing of an ordinary telegraph key, the upper perforations starting the signal and the lower ending it. Thus, in the letter "A," which is composed of a dot and a dash, the first lower hole is almost directly below the first upper hole, so that, as the tape moves along, the upper contact will no sooner "close" the radio circuit than the lower comes along and stops it, and the almost instantaneous flash that has been allowed to escape is called a "dot." The upper contacts then come together through the next hole, and as there is quite a distance traveled by the tape before the next lower hole comes along, the flash sent out in the meantime has been of an appreciable duration, and is called a "dash."

There are a number of patented mechanical transmitters, varying only in the means employed to the common end. They can be speeded to any desired number of words per minute; but as a rule a steady jog of approximately 30 words per minute is maintained. However, since this speed is far below the ordinary typist's average, some machines are so arranged that, while the operator manipulates the keyboard at his habitual speed, the tape moves between the contacts at a properly reduced rate.



The Typewriterlike Machine Which Perforates the Transmitting Tape and a Sample of the Latter are Shown at the Left, and at the Right, the Whole Sending Outfit with Magazine Rolls of Tape and Transmitter Proper, the Latter Standing on the Small Table in the Middle

EXPERIMENTAL BAMBOO GROVE PLANTED IN GEORGIA

Efforts are being made by the Department of Agriculture to interest southern farmers in the growing of bamboo to supply the domestic demand which results in the annual importation of cane stalks worth $5,000,000 from Japan. An experimental grove has been planted in Georgia.

GERMAN BABIES' MILK BOTTLES STERILIZED BY MACHINE

Germany, for characteristic reasons, is now giving more than usual care to the rising generation. In the hospital for babies at Berlin, a special machine has been devised for sterilizing the nursing bottles. A large drum revolving in a semicylindrical tank holds a number of bottles at one time, subjecting them all to positive and efficient sterilization.

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Machine Used in the Hospital for Babies at Berlin, Germany, for Sterilizing Nursing Bottles: A Large Number of Bottles are Sterilized at One Time, with Certainty and Precision

CHINESE WOOD-OIL INDUSTRY LACKS MODERN MACHINERY

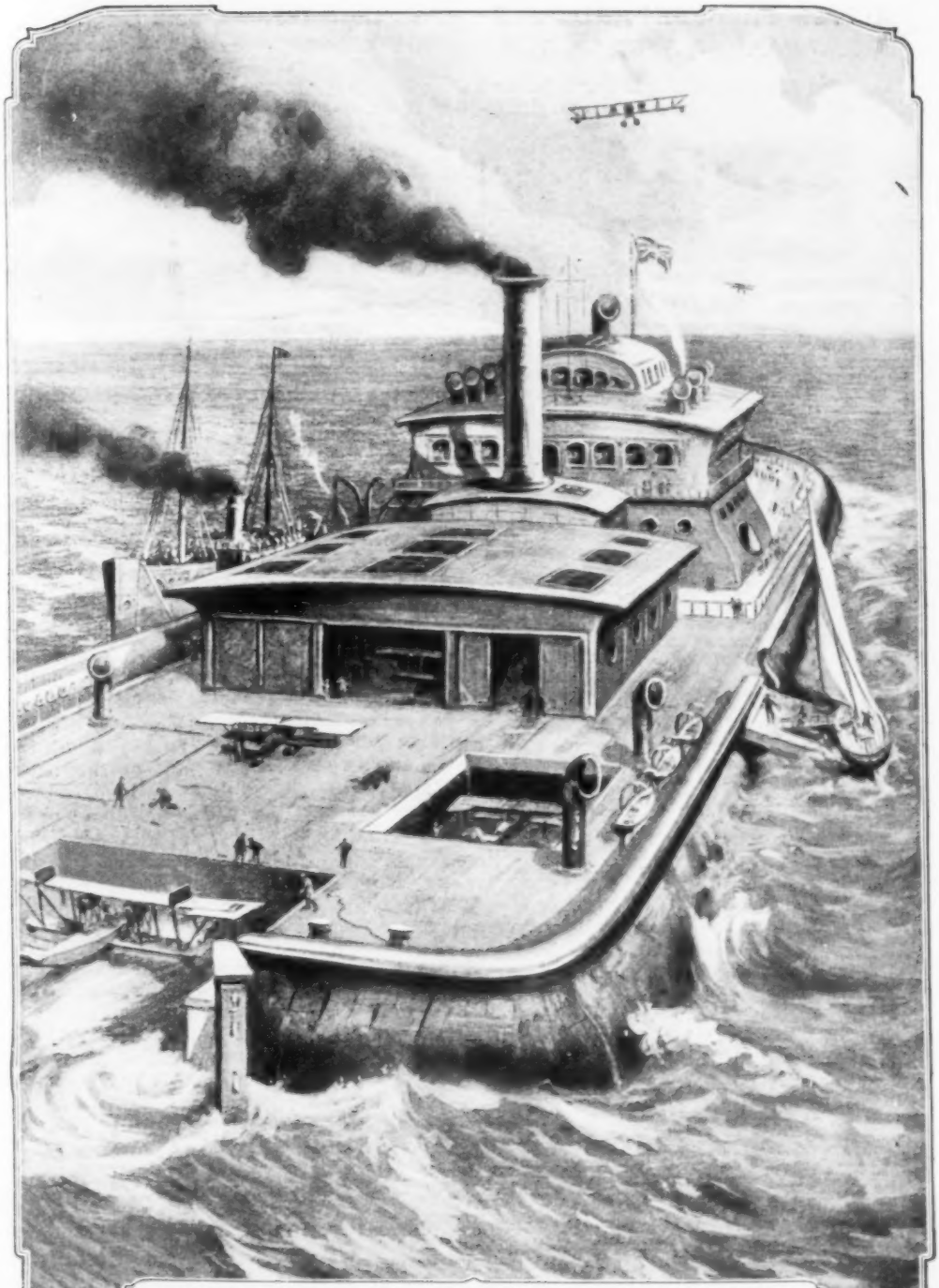
With more efficient mechanical assistance, the output of wood oil, an important Chinese product in spite of the crude methods employed in its manufacture, could be increased materially, according to an authority who has devoted much time to a study of the subject. The oil is obtained from the seeds of certain deciduous trees that can be grown in practically all parts of the oriental country. Placed in a circular stone trough, the seeds are crushed by a heavy stone roller, moved by native draft animals, such as buffaloes or cows. This pulp is roasted and steamed, then molded into circular cakes, which are subjected to pressure in a primitive hand press. After being heated and strained, the resultant liquid is ready for market. This process extracts oil equal to 40 per cent of the weight of the seeds, though the latter contain 53 per cent. Up-to-date machinery is the chief need of the industry.

AIR-DRIVEN MINE STOPING DRILL HAS WATER JET

Stoping drills used by miners are usually rotated by hand, automatic rotation being difficult to control in mixed soil or on inclined surfaces. A new form of tool overcomes these difficulties by providing a coil-type brake band, hand-operated, which grips the pneumatic feed piston and instantly retards it whenever desired, the cranklike handle of the brake lever being in the grasp of the operator at all times. Rotation is accomplished by an extension bar on the piston, which has grooves alternately straight and spiral, a ratchet collar allowing a straight blow and rotation on the return stroke. A dust-laying water jet through the drill itself, avoiding the customary deluging of the operator, is another feature. The air exhausts downward through a flange on the drill chuck, which serves to deflect sludge and chips from the operator.

Self-Rotating Stoper Drill in Use, Drilling an Upwardly Inclined Hole: The Operator's Hand Is on the Brake Lever. The Two Hose Lines Supply Air and Water

FLOATING BASES FOR TRANSOCEANIC AIR TRAVEL

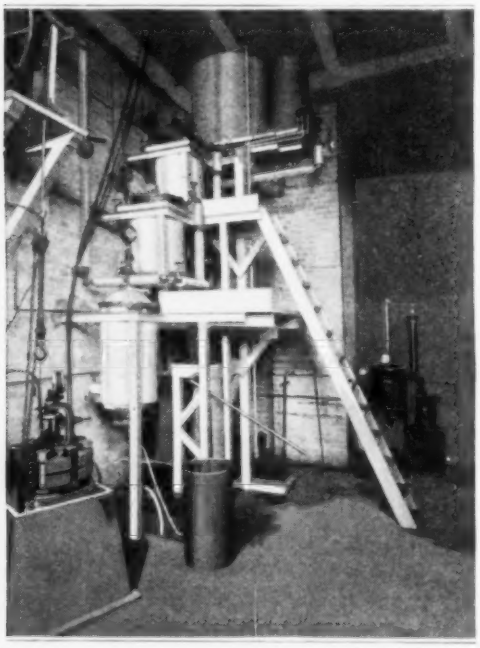


SUCCESSFUL transoceanic seaplane service will almost certainly require the presence in mid-ocean of floating supply and repair bases. A contemplated design is shown here. Held in its plotted position by heavy anchors and powerful propellers, the artificial "island" receives the seaplane on a floating pontoon which is later raised to deck level. A comfortable hotel provides shelter for the passengers.

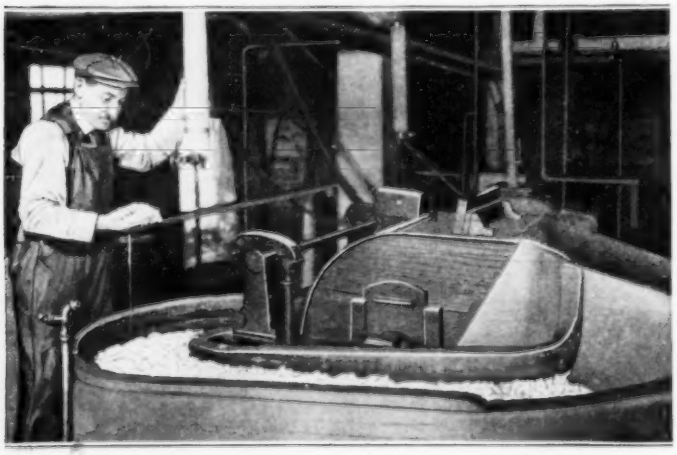
FROM THE SPHERE, LONDON. COPYRIGHT BY THE NEW YORK HERALD

RECLAIM PARAFFIN AND PULP FROM WAXED-PAPER WASTE

Hygienic air-tight cartons for food and other commodities, and sanitary drinking cups, have enormously increased the production of waxed paper, until the weekly output reaches the figure of 2,400,000 lb., all of which becomes waste. By a system devised by the U. S. Forest Products Laboratory, both the wax and the pulp may now be reclaimed. The waste is placed in a metal cylinder, 3 ft. high and 1½ ft. in diameter, with a quantity of gasoline. A steam coil in the cylinder boils the gasoline, which is fed through a condenser and returned. It is then drained off to recover the wax, and a fresh charge substituted. Final recovery is made by blowing live steam through the cylinder and condensing the vapors, while the pulp residue is turned into the pulp-beating machine, where it begins its reconversion into paper.



Experimental Battery of Cylinders for Reclaiming the Paraffin in Waxed Paper, at the Forest Products Laboratory



Pulp-Beating Machine into Which the Pulp Residue is Turned After the Paraffin has been Completely Removed by Treatment with Steam and Gasoline

NEW PROCESS AIDS PRODUCERS OF SUGAR AND ALCOHOL

Beet-sugar refineries have been compelled to operate only in sections producing a supply of raw material, and to remain idle between crops, because of the fact that the vegetables utilized require treatment immediately after maturing, under established methods. As a result, the cost of transporting fuel to the factories has been high, since they are seldom located near coal mines, and their activity limited to a brief season. These impediments are declared to have been eliminated by a recently developed process, which extracts nearly 70 per cent of the water contained in the beet roots on the spot where they are grown, and preserves them indefinitely. In dry form, the raw material can be hauled economically, even long distances, thus making possible the location of sugar refineries in coal-producing regions. The desiccated material can be stored, and converted into sugar whenever convenient. With a large supply on hand, a factory can run continuously. The process also can be employed by industrial-alcohol distilleries that use fruits or vegetables of similar composition.

¶So vast is the present store of silver in the United States Treasury that vault walls are bulging out, and part of the building itself threatens to crumble. To meet the emergency the secretary is asking for a new three-story vault building, to cost about $1,500,000.

Pergola of Rustic Design in the Decorah Park: Logs are Laid across Other Logs Set upon Masonry Columns Which are Built Up of Blocks of Rough Native Limestone, Peculiar for Its Pitted and Eroded Surfaces

PARK POSSIBILITIES REALIZED IN SMALL TOWN

By AVIS GORDON VESTAL

THE park possibilities of a small town are pleasingly illustrated by the public playground of Decorah, in the extreme northeastern corner of Iowa. The region is rugged and the park site, at the crest of a sharp bluff rising 100 ft. or more above the upper Iowa River, offers an inspiring view across wooded hills and fertile valleys. It is quite accessible, being less than a mile from the business center of the town. An emergency—the imminent sale of this grove of oaks and elms for a cattle - feeding pen — led public-spirited citizens to propose the purchase of the 14-acre plot for a city park. Within a short time $2,500 was collected by popular subscription to secure the land and start its development. More recently an adjoining tract of 18 acres has been donated by one of the city's business men. The landscaping and care of the grounds are in charge of a commissioner who has at his disposal about $1,500 yearly, raised by the municipality through taxation.

The Motor-Driveway Entrance to the Park is Flanked by Massive Square Pillars of the Same Limestone, Each Surmounted by Graceful Electric-Light Fixtures. Similar Pillars Mark Other Entrances to the Park

The policy of the park's manager is twofold. First, natural effects are retained. Few trees are cut. Patches of underbrush and wild flowers under the denser tree shade are protected from vandalism by fences bordering winding paths. Few bridges are built, though the land is picturesquely diversified by

hills and hollows. More often paths are laid out, or stone-flagged steps, with balustrades where advisable, facilitate climbing the bluff or the ravines.

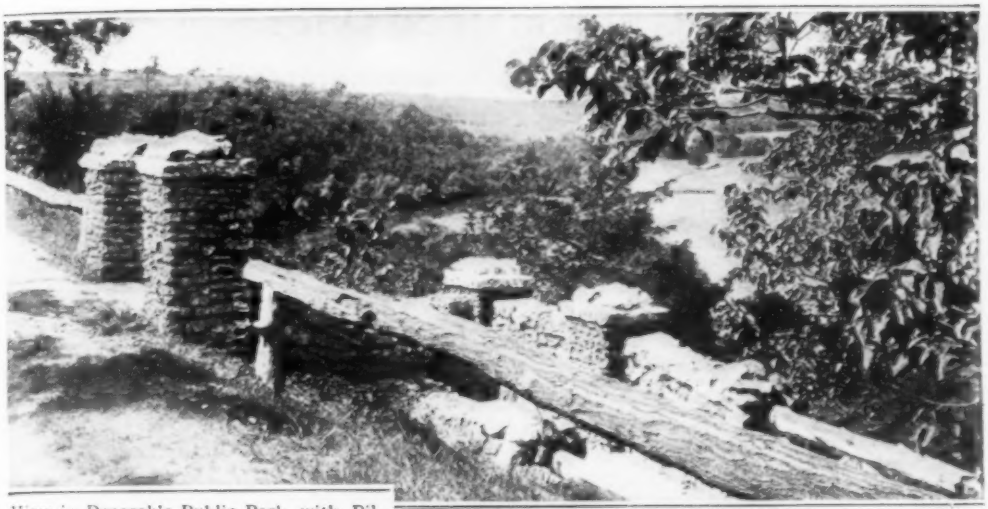
Even the Band Stand Carries Out the Rustic Idea, Built as It is of Birch and Elm Logs Set in Foundation Posts of Limestone, the Corroded and Honeycombed Surface of the Latter Relieving the Heavy Effect of the Other Material

A second phase of the plan is the use of native materials, chiefly heavy logs of elm, either peeled or with the rough bark clinging; of white birch for rustic decorative details where strength is not a requisite; and of a peculiar limestone, honeycombed by unequal weathering or erosion, and used in rough, irregular blocks for the masonry work. The original designs were created by the commissioner and were built under his supervision by day labor, which accounts for their extremely low cost. The prices of the various structures mentioned hereafter are only approximate, but are given upon the authority of the commissioner.

Several city conveniences have been conveyed to the park, among them electric lights, running water, and gas. The provisions made for picnic parties attract not only the townfolk, but also motor parties. Drinking fountains are at hand. Their overflow is piped underground and issues from a hillside in the appearance of a spring falling down over rocky ledges. Safe camp stoves have been built. The newest service is the construction, in the summer of 1919, of a "cook's corner" of hollow-tile blocks, with rough stone framing two open doorways. A roof protects from sun and rain, while two solid end walls shelter the flames from wind. A concrete shelf at each end supports several gas plates supplied by a coin-in-the-slot device.

Among the facilities for recreation of children and adults are many pieces of special playground apparatus, a tennis court, and band stand. The latter, built in rustic style, cost about $400. Benches and tables for serving meals are among the minor conveniences provided here.

The Little Two-Door Cabin Pictured Above is Known in the Park as "Cook's Corner," Because It is Intended for the Use of Those Who Aspire to a Hot Lunch. It is Built of Hollow Tile and Rough Stone, and Contains Two Concrete Shelves Equipped with a Number of Gas Plates, Which Yield Their Fuel on Insertion of a Coin. The Small but Effective Fountain at the Right is Built, as is Plainly Seen, of Bowlders and a Spray Nozzle, and Stands, as a Miniature Island, in the Center of an Artificial Pond Confined by a Cemented Basin

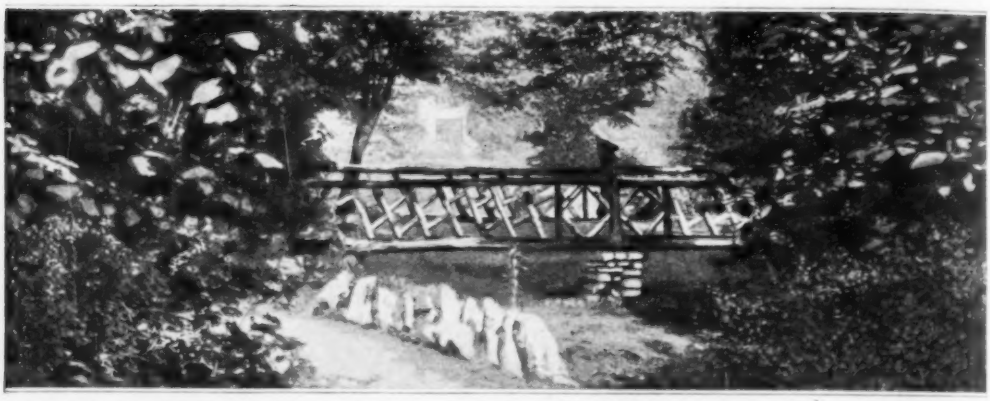


View in Decorah's Public Park, with Pillared Entrance to Stairway down the Hill, and Protective Rail of Logs and Stone, Showing Extensive Use of "Honeycomb" Limestone

An Outcropping of the "Honeycomb" Limestone Common to the Region, Used Generously by the Park Builders: Its Corroded Surfaces Result from Unequal Weathering

Observation Balcony on the Bluff, Simply Constructed of Birch Logs and Approached by a Path Bordered with Limestone Fragments to Retard Erosion

The Playground, in Which a Number of Trees have been Left Standing, Contains Its Full Complement of the Usual Modern Appurtenances, as Chutes, Horizontal Bars, and a Profusion of the Ever-Popular Swings Suspended from Securely Anchored Supports



Birch Rails on This Rustic Bridge Contribute Not a Little to Its Attractiveness and Interest, While Its Appearance is Improved by the Simple Arrangement of the Braces. The Piers Are of Limestone

A number of artistic and serviceable structures have been erected. The first to greet the eye of the motor visitor is a pair of stone pillars at the entrance, each capped by a graceful electric-light fixture. A rustic bridge, railed with birch, cost between $100 and $150. A point to be noted about birch is that while it is peculiarly attractive for rustic outdoor construction, it is less durable than other woods and requires replacement every few years. Hillside staircases with log guard rails, and stone pillars and balustrades, were erected for about $25 to $30 each.

An artificial pond occupies a cemented basin, and contains a spraying fountain rising from a miniature island of stones. The cost of this was about $900. At several points on the margins of the bluff, paths lead to lookout stations of birch, floored, roofed, and seated for the comfortable enjoyment of sight-seeing, which is said to be especially attractive when the trees are in autumn foliage. About $75 to $100 covered the cost of each outlook. Possibly the most appealing of all the outdoor furnishings is a long pergola, in the building of which a groundwork of stone bears heavy beams and light birch braces. From high-backed benches a beautiful landscape is visible, framed by the pillars, which are partially draped by green vines. The expenditure of $400 is surprisingly low for a structure of its size.

TIMBER LINE OF NORTH CREEPS SOUTH

Only the frontier marks the advance of civilization; only the borderland between life and desolation, where nature's last outposts struggle for existence on the edge of everlasting ice, tells the story of the cold that moves inch by inch and year by year to its final conquest of the earth. The timber line of the far North is creeping inexorably southward. Scientists of the Canadian Geological Survey have found that the latitude that permitted the sapling spruces to take root even 50 years ago, now denies them life. The millions of trees that make up the last line of timber today will never reproduce their kind; and when they die, desolation gains another step.

Along the Far-Northern Line of Canadian Forest, Where the Hardy Spruces are Thinning Out as the Cold Grows More Intense from Year to Year

AMERICAN NAVIGATION LAWS ARE TO BE MODERNIZED

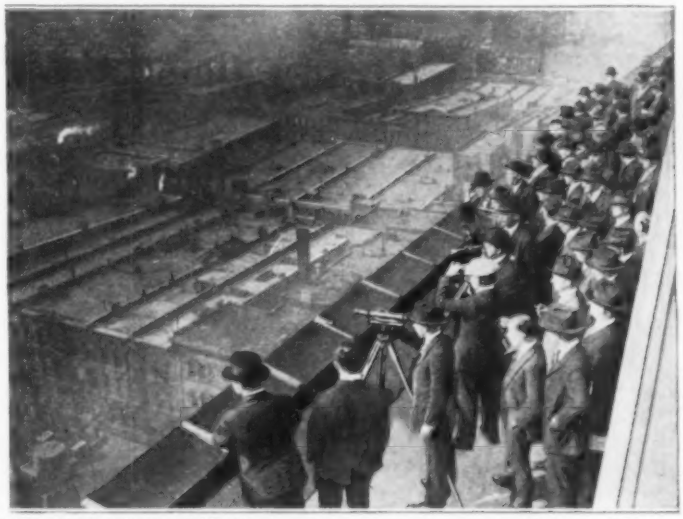
Thorough renovation of all American shipping regulations, grown antiquated and inadequate in the light of modern requirements, is being undertaken by a commission of 13 navigation experts, appointed by the U. S. Shipping Board. Steamboat-inspection laws will come in for a share of the investigation. Advocates of the revision of these laws are convinced that the progress of the American merchant marine has been hampered by requirements of construction, operation, and inspection declared to be obsolete, and the commission is expected to make recommendations to congress which will remove these obstacles. All criticisms of present conditions are welcomed by the commission, but only if they are supplemented by workable plans of remedy.

CARNIVAL "FAKER" INFLATES BALLOONS WITH GAS TANK

A toy-balloon vender who sells his wares at street carnivals and county fairs has proved that enterprise brings its rewards in every trade. He no longer inflates his balloons in private, and by lung power or over the gas jet. On the contrary, he prepares his stock before the eyes of the crowd, using a tank of compressed gas. Placing the mouth of each little rubber envelope over the outlet valve, he turns the thumb cock to the left, then quickly to the right, and the balloon is inflated. It's very simple, but it draws a crowd.

USE TELESCOPES TO DISCOVER VIOLATIONS OF SMOKE LAW

The city of Chicago has an antismoking ordinance which is being rigidly enforced by new and drastic methods. The law, however, relates not to individuals, but specifically to chimneys, and it is sometimes difficult to determine, at a distance, which particular stacks are causing the atmospheric pollution. So the large staff of smoke inspectors congregate on the city-hall roof, and search the horizon with high-powered telescopes. Armed with evidence thus secured, they first warn, and then draw the fires of those who persist in violating the rule.



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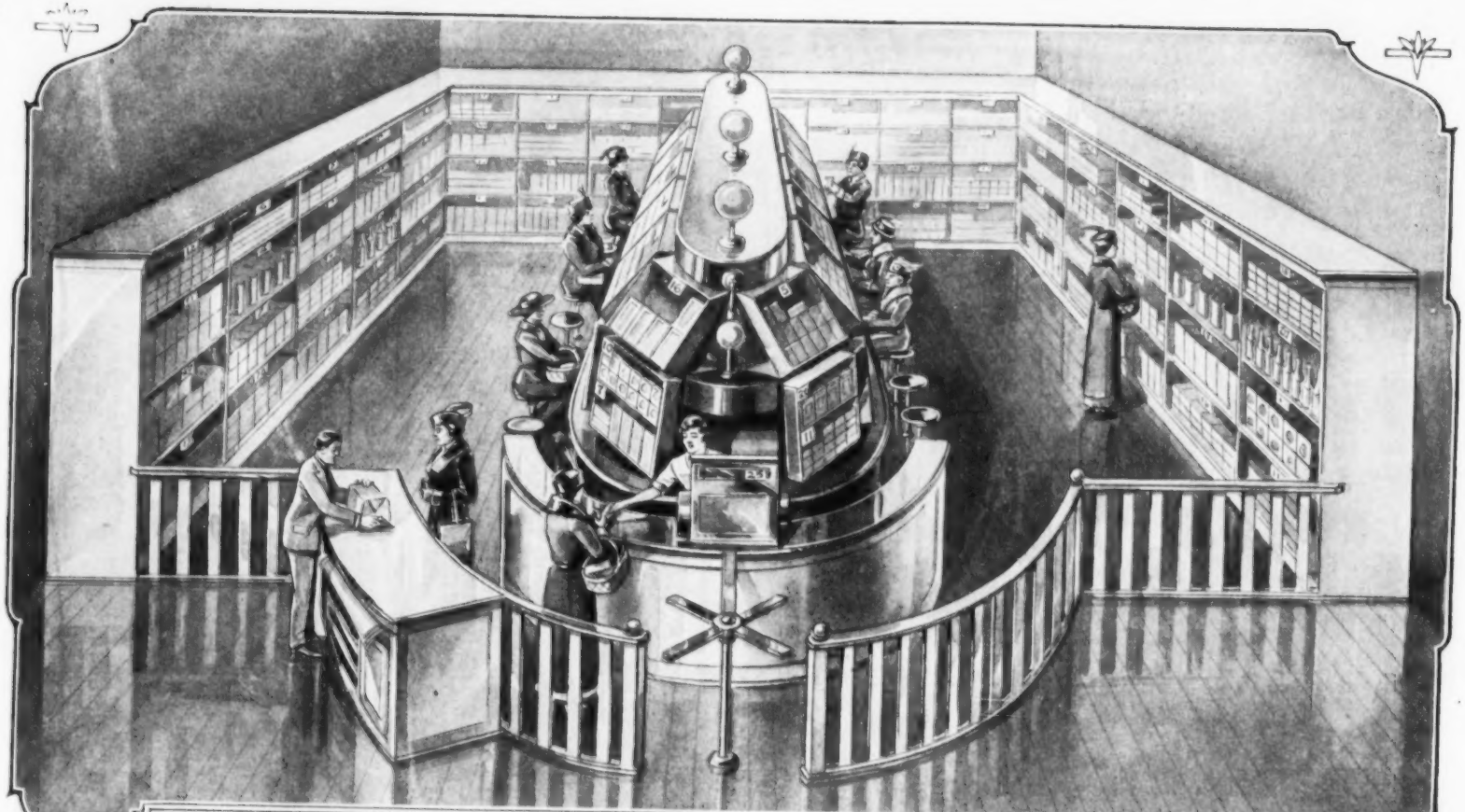
Smoke Inspectors of the City of Chicago, Watching the City's Sky Line through Telescopes to Detect Violations of the Smoke Ordinance

ROARING COLUMN OF HOT LAVA SPOUTS FROM MAUNA LOA

Mauna Loa, Hawaii's great volcano, has burst forth in another eruption, hurling a stream of lava 20 to 30 ft. deep and 1,000 ft. wide down the mountain side into the sea. A party of scientists who made their perilous way to within a mile of the fissure reported a new crack from which flowed a lava stream a mile wide, while lava columns, 300 ft. across and 300 to 400 ft. high, issued with a tremendous roar. One molten stream, flowing 20 miles to the sea with extraordinary velocity, has built a quarter-mile-long cape, the ocean meanwhile boiling for half a mile around, causing a small tidal wave.



Retail Store Operated by Machinery: The Long Center Counter Has Its Shelves and Compartments Arranged on an Endless Belt, Which Travels Slowly but Continuously Past the Customers, Who Sit upon Stools before It and Select Their Needs as the Goods Go By. A Two-Horsepower Motor or Engine Takes Care of the Mechanical Considerations, While the Man Power is Represented by Three Individuals—a Supervisor, a Manager, and a Bundle Wrapper—Instead of the Sixteen Who would be Required for the Same Personal Service. Some 40 Customers at One Time can be Handled by This Force, the Shoppers Paying Their Reckoning as They Pass the Appraising Eye of the Manager on the Way Out

MACHINERY SERVES SHOPPERS IN NEW RETAIL STORE

Few employes are required in a mechanical self-help retail store invented by a southern merchant, though a large number of customers can be given efficient service in a short time. A sectional tier of shelves for the display of package goods is attached to an endless belt which passes around an elliptical base, and is moved either by an electric motor or a gasoline engine. Along the sides of the base stools are provided for shoppers, who select their purchases as the shelves pass in front of them. At the front of the store a ratchet turnstile permits patrons to enter at one side of the base, and to leave at the other. The clerical staff consists of three persons: a supervisor, who regulates the speed of the belt and replenishes the supply of goods on the shelves, a bundle wrapper, and a cashier. The latter two are stationed at desks near the exit.

EXPLORERS ROW FIFTY MILES THROUGH ARCTIC STORM

A perilous two-day trip in small boats was made by members of an arctic exploring party, and the crew of the vessel which carried them north, after the ship was wrecked late last summer in Hudson Bay. Cold weather was imminent, and it was necessary to reach a fur-trading station, 50 miles away, before ice rendered travel impossible. The men hurriedly provisioned and launched three lifeboats. Though a terrific storm was raging, the voyage was begun immediately. One fragile craft reached the mainland without mishap, but the others, leaking badly, were forced to stop at an island, five miles from shore. Here the occupants of the first boat joined their companions, risking their lives rowing to the island. As soon as the boats were repaired, the men proceeded to the settlement, where later they boarded a ship that returned them to civilization.

FIND MEASUREMENT FOR SOUND WITH NEW INSTRUMENTS

Sound, though seemingly a very definite manifestation of activity, is peculiar among physical phenomena for its lack of units or means of measurement. An American physicist has finally arrived at a method of expressing sound values in watts, making absolute measurements with new and rather complex apparatus. A standard source of sound, called a "phone," is made adjustable in tone by changing the volume of the resonator and the tension of wires supporting a mica diaphragm. The light-interference method is used to mark vibrational variations in the measuring device, called a "phonometer," lateral displacement being noted by means of a telescope mounted on a tuning fork made of quartz.

RIVER HOUSE BOAT DRY-DOCKED ON WOODEN PILES

Confronted with the alternative of placing his house boat in a public dry dock for repairs, an expensive proposition, the owner contrived a much less costly means of removing it from the Willamette River, on which it floats. Steel-pointed wooden piles were driven into the river bottom near the shore just before the spring freshet. When the stream rose, the upper ends of the stakes were submerged, and the boat was floated over them and anchored. As the water receded, it left the vessel stranded on top of the piles, making accessible all parts of the hull. With the next high water the craft was again floated, and towed

House-Boat Dry Dock: The Vessel was Floated over the Piles When the River Was in Flood, and Stranded on Them When the Water Receded

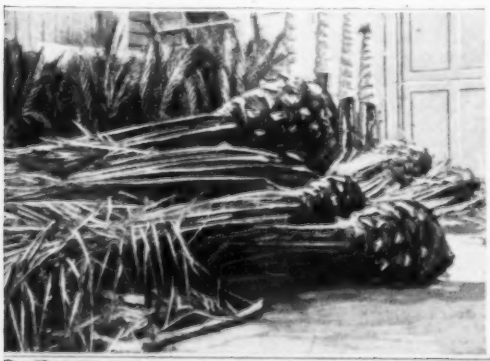
to another location. The house boat is 38 ft. wide and 106 ft. long. It is two stories in height, and contains 16 rooms, including a large hall for dancing.

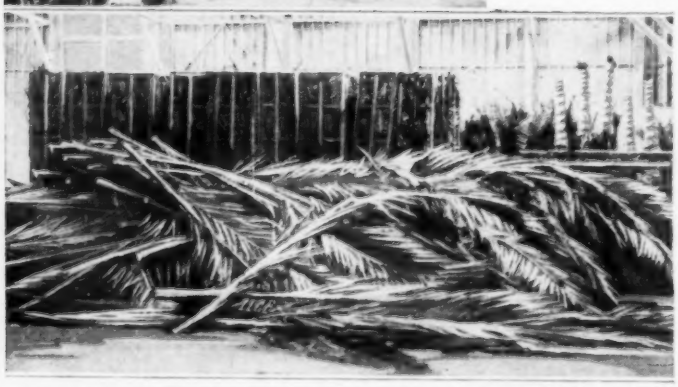
PHOTOS BY GILLIAMS SERVICE

The "Sheltering Palms," So Conspicuous in the Background, Are a Part of the Hundred That were Transported to the Barren Bit of Rock That Became Magically Tropical, Almost Overnight. The Movie People are Salvaging Their Wreck after the Storm

BARREN ISLE MADE TROPICAL BY HERCULEAN LABOR

The transformation of a barren, rocky island in the north Pacific into the verdurous replica of a bit of south-sea tropics, a task recently completed, may be listed as one of the most audacious undertakings ever attempted even by a motion-picture producer. Prevented by his time schedule from visiting a real tropical isle, the director decided on the conversion of a spot of desert rock that emerged from the sea some 100 miles from the studio headquarters in southern California. Since the picture called for full views of the island, "faking" was out of the question.





Palms and Other Tropical Foliage are Seen in the Upper Picture Ready for Shipment to the Desert Isle, Their Luxuriance to be Increased by Adding the Palm Branches of the Lower View

Four pontoon piers were built on the island beach for landing the supplies, and then, from the California shore, were shipped more than 100 growing cactus palms, roots and all; 100 orange and 100 lemon trees, bearing fruit; 50 crates of tropical rushes; and large numbers of avocado trees, bananas, sago palms, and grapefruit trees. Coconut palms, however, without which no tropic scene is complete, were beyond the resources of the Golden State, and hundreds of them had to be brought from distant Florida, while 1,000 coconuts in the hull, to dress them

with, were shipped in from Rio Janeiro. Then 15 horticulturists spent two weeks in planting and arranging the subequatorial vegetation.

The big undertaking was completed by taking to the island equipment and supplies for 40 persons for a month, materials for a four-room house to be built in the picture play, and finally for constructing a realistic shipwreck on shore—firmly anchored to last for the period of the stay. And incidentally, in landing on the rocky shore, the party experienced a real shipwreck.

PHOTO BY GILLIAMS SERVICE

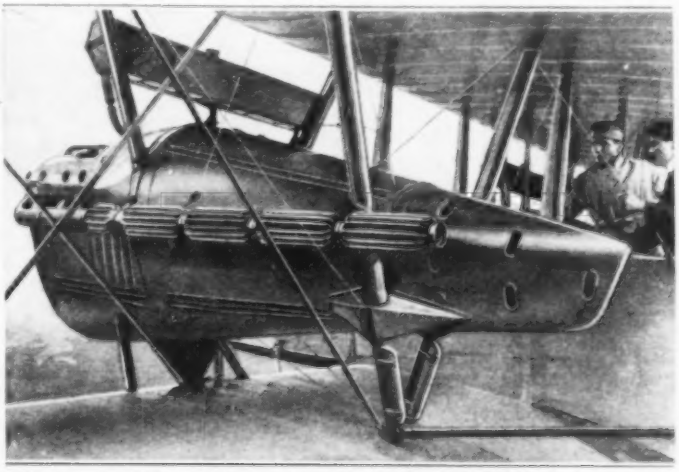
The Wreck of the Yacht on the Make-Believe Tropical Shore, Sent Deliberately to Its Doom to Add Verisimilitude to the Motion Picture: The Hull is Anchored to Preserve Its Appearance through All the Scenes

CITY WALL OF PEKING TOPPED BY CONCRETE WIRELESS MAST

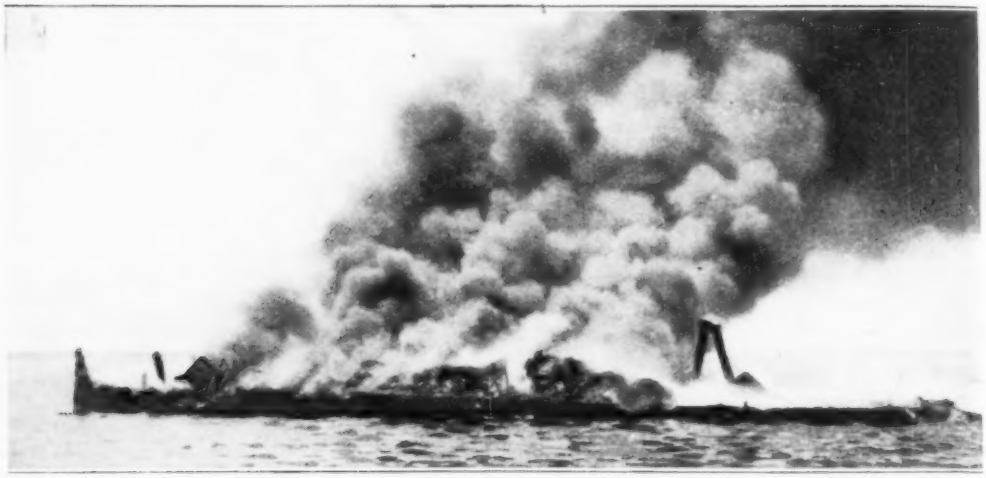
A wireless mast of reinforced concrete, 164 ft. high and 16¾ in. in diameter at the base, was constructed some time ago for the American navy on the ancient city wall of Peking, China. The wall at this point measures 40 ft. high and 46 ft. wide. A concrete pole of such a height is in itself a novelty, but in this case interest centers on the story of the construction. The 13-ton pole was first cast in a horizontal position, and in two pieces which were to have been erected by elaborate lifting tackle. During erection, however, the Chinese coolies misunderstood a command, with the result that the upper section broke loose and crashed to the ground. The engineers then decided on the more costly expedient of casting the mast vertically from a timber scaffold. With much difficulty an upright mold and scaffold was built, and later held perfectly rigid during the many days required for the concrete to set and dry. Success rewarded persistency, and the mast has now given several months' satisfactory service. In fact, an order has been given for an additional mast.

FRENCH ARMY ADOPTS MUFFLER FOR AIRPLANE ENGINES

Like all healthy youngsters, the airplane is a noisy affair. Propeller and engine unite to produce a roar that always makes conversation difficult, and, in time of war, supplies to a keen-eared enemy a sure warning of impending danger. Designers are seeking to mitigate the evil, and so far, though unable to deaden the "whir" of the propeller, have produced numerous featherweight mufflers to silence the engine exhaust. The attachment has passed the experimental stage, as the French army has adopted a standard mechanism for war airplanes.



This Airplane-Engine Muffler, Adopted by the French Army, is seen to be Provided with Radial Plates to Increase the Cooling Area, Thus Lessening the Usual Danger of Fire Starting from the Red-Hot Exhaust Gases



An Awe-Inspiring Spectacle in Manila Harbor: The "Eclipse," Used in the Gasoline Trade, Burning to the Water's Edge Following an Explosion Caused by a Back-Firing Engine

CONCRETE JACKETS TO ANCHOR POLES DURING NEXT FLOOD

In one low-lying river valley where floods are a yearly menace the local power company has insured the permanency of its service by anchoring the poles in heavy concrete. Each pole is incased, from 6 ft. below the ground to 12 ft. above, in a hexagonal jacket of concrete which is about a foot and a half thick. The solidity of this construction gives the company officials confidence that the next flood will not affect the service along the river.

Comparison with the Man in the Foreground will Reveal the Size of the Concrete Jackets Which are to Anchor These Poles against the Next Overflowing of the River

EXPLOSION OF GASOLINE BOAT FOLLOWS ENGINE BACK FIRE

A back-firing engine was the cause of an explosion and fire which totally consumed the gasoline-trade vessel "Eclipse" in Manila harbor, P. I., a short time ago. The ship was loading its inflammable cargo for a trip to Cebu when the accident occurred. The alarmed officers of neighboring ships in the well-filled harbor were prevented from giving any assistance by the scattering of burning gasoline and oil, and the vessel burned to the water's edge. It was viewed from the beach by a large number of awed spectators, who silently watched the roll of smoke and play of lurid flame across a brilliant sunset. Only four of the crew were injured, and those not dangerously.

METAL SHEATHING FOR HOUSES TAKES PLACE OF PAPER

Lining a house with sheet zinc, as a packing case is lined when its valuable contents are to be protected against moisture and vermin, is a new and simple improvement in building methods that promises many advantages. The zinc is sold in rolls like the paper it replaces, and is so thin that a roll of 150 ft., 16 in. wide, weighs only 60 lb. It is easily nailed without preliminary punching, directly to the studding, doing away with all sheathing lumber, and is practically as easy to cut and fit as paper. Added to its great protective advantages, it has a high salvage value.

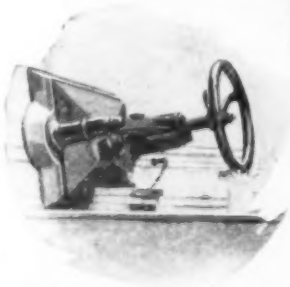
VALUABLE OIL FROM COCKLEBURS

By S. R. WINTERS

THE prickly cocklebur (*Xanthium echinatum*), growing riotously over a wide expanse of territory and hitherto utterly valueless, is to be salvaged to useful purposes. Recent experiments by Prof. L. B. Rhodes, oil chemist of the North Carolina Department of Agriculture, have discovered the pest a container, and potential commercial source, of oil, available for use in paints and varnishes and as an edible product.

While the investigation has just emerged from the laboratory stage, the product has been given a definite value. Unlike similar developments, the discovery of the worth of the cocklebur was not one of the searching eye of war conservation. Rather, the idea that the wayside weed possessed intrinsic value was conceived in the boyhood days of Professor Rhodes, when he observed that Dame Nature threw a cloak of protection around them. Worms, birds, and squirrels contemptuously pronounce the prickly burs unfit for consumption and ignore them. Mankind, especially those individuals who frequently commune with nature's out-of-doors, will testify to their repugnance for the burs and the opposite inclination of the sticky thorns—a characteristic of clinging tenacity. By a curious quirk of nature, the burs are doubly protected in their seeding habits—one-half of the bur sprouting one year, with the seed rou[illegible]g out its finished form the succeeding year.

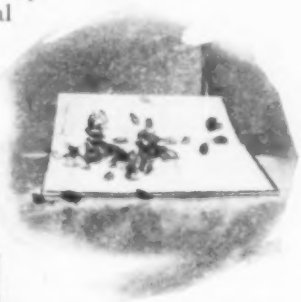
Cutting the Burs in Half with a Photographic-Paper Trimmer, in Order to Extract the Kernels from the Skin and Hull, Done by Shaking the Cut Burs in a Box



Experimental Cocklebur Press Made from an Old Letterpress, Two Bits of Iron, and Some Cheesecloth

The plant, together with other varieties of the same family, is of common and extensive distribution. It grows abundantly throughout the southeastern states, and is extremely prolific in California and Kentucky. The tendency of the plant to "bunch" its growth will facilitate the use of machinery in harvesting the burs—a factor which will ultimately determine the commercial value of the prickly crop.

The chemical process of procuring the oil from the burs is simplicity itself. In the experiments the burs were plucked from the wayside, placed on a table and cut singly in halves, using a trimming board. The sliced portions of the dry burs were deposited in a cigar box and given a vigorous shaking, the scrambling separating the kernels from the hulls as well as unloosing the black covering that envelops the kernel.



The Burs as They are Harvested Are Disagreeably Familiar to All

After the accumulation of a considerable quantity of kernels, they were deposited in a mortar and pounded gently. By blowing across the kernels, the black hulls and chaff were removed. The kernels were then pounded into a meal, the product being of a gray color, savory odor, but of bitter taste, due to the presence of alkaloids. Without further treatment, the meal was incased in bits of cheesecloth and subjected to immense pressure. A discarded bookpress, now almost obsolete in modern-day practice, was employed, with the aid of two pieces of steel only two inches square. The strips of steel were rescued from an abandoned piece of metal discovered while walking along a railroad track. It was sawed diagonally into two parts with a hacksaw. A heavy iron

washer was placed on the top plate. After remaining untouched for several days, the oil was filtered through an ordinary piece of filter paper.

The oil is of a light yellow color, is sparkling, and has a savory odor. When robbed of its alkaloids, the taste is described as being agreeable, although having no marked characteristics. It retains its qualities well, a sample stored for six months in a dark, cool place failing to develop any rancidity. One bushel of crude burs contains .96 lb. of oil.

The chemist has discovered virtue in the plant as an edible product for man and in the by-products a source of sustenance for cattle. Of technical value, it can be used as a drying oil in paints and varnishes.

The by-products resulting from the manufacture of the oil would enhance the commercial possibilities of the industry. The meal, containing some 40 per cent protein, would be valuable as a fertilizer or in relieving the monotony of cattle diet. The chamber of commerce of Los Angeles, Calif., has requested verification of the protein content with the view of diverting its castor-oil manufacturing equipment into an outfit for experiments with cockleburs.

According to preliminary scientific conclusions this newly discovered material seems to promise important possibilities as a lubricating oil, as an ingredient for the soap manufacturer, and, when produced on a commercial scale, as a new solid-fat substitute for butter and lard.

STEAM COOKING IN THE FIELD WITH IMPROVISED PLANT

Cooking dinner in the field for a crowd of farmers engaged in a plowing contest has its own terrors, as any farmer's wife will testify who has experienced the heat and smoke produced on such an occasion. During a recent event of the sort in a mid-west farming center, however, the proceedings were effectually relieved of their distress by the exercise of a little mechanical ingenuity. A big steam thresher was halted near the dining tent, and a pipe run from its boiler to a convenient spot. From a T-joint smaller pipes were run, each with a valve some 30 in. from the end. Big crocks, buckets, and wash boilers were filled with water, and a pipe end inserted in each. When the valves were opened the water began to boil, and all the cooking was done, and well done, without heat, smoke, or trouble.

Steam-Cooking Table Improvised in the Field: A Pipe Extends into Each Crock and Bucket, and Steam from a Threshing Machine beyond the Fence Boils the Water and Cooks the Dinner

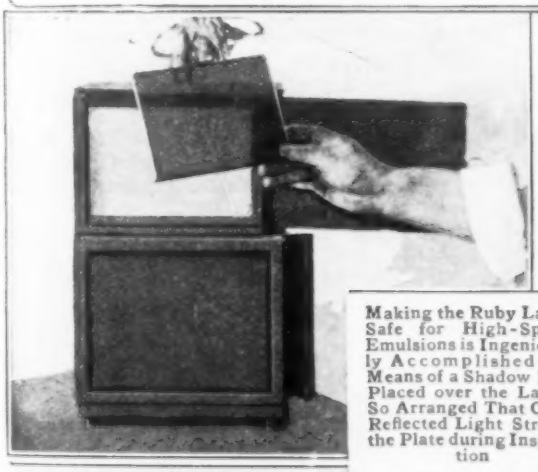
CHINESE SALT MANUFACTURERS USE QUEER CALDRONS

Huge vessels composed of plaited strips of bamboo, coated on both sides with a mixture of brine, ashes, and lime, are employed by salt manufacturers on the coast of China for boiling sea water, by which process the product is obtained. Quite frequently these novel caldrons are as much as 21 ft. long, 20 ft. wide, and 7 in. deep, though their size varies. When in use, the troughs are suspended over a mud furnace by straw ropes, which are attached to an overhead frame that is supported by pillars of mud or masonry. Each kettle can be used for 10 days before being discarded. Salt is extracted from it during this period by scraping the bottom. After a container has become unserviceable, it is destroyed, and the fragments are sold to farmers as fertilizer at a price equal to its cost.

IMPROVED EQUIPMENT FOR THE PHOTOGRAPHER

A Revolving and Heated Drier, with a Capacity for Handling Hundreds of Wet Prints at One Time, Now Makes It Possible for the Professional Photographer to Deliver Unmounted Pictures, Finished, to the Customer One Minute After They are Taken from the Washing Bath

The Hollow Pedestal of Stoneware Is a Developing Tank, Designed to Handle Large Quantities of Roll Film for the Amateur Trade: Grooves Take the Metal Film Brackets



Making the Ruby Lamp Safe for High-Speed Emulsions is Ingeniously Accomplished by Means of a Shadow Box Placed over the Lamp, So Arranged That Only Reflected Light Strikes the Plate during Inspection

A Valuable Addition to the Studio Furniture Is a New Set of Nesting Stools: They Put Away into Very Little Space, as Seen Above, and When Separated, as at the Left, Accommodate the Whole Family for Almost Any Kind of Group Picture

TOBOGGAN SLIDE ABANDONED AFTER FATAL ACCIDENTS

Tragic consequences followed an innocent attempt by American army engineers, on duty in Siberia, to introduce

On This Icy Slide, Built by American Soldiers in a Siberian City, Several Russians Lost Their Lives While Learning to Coast

a new sport to the natives. Utilizing their spare time, the soldiers constructed a steep toboggan slide, and endeavored to teach the Russians how to coast down the ice-covered incline on sleds. The pastime proved popular, but the amateur participants were forced to abandon it within a short time, as several were killed and many injured in the numerous accidents resulting from their inexperience.

¶The world's altitude record for a seaplane carrying a passenger was recently broken when a height of 19,100 ft. was reached over Port Washington, N. Y.

POPULARITY OF YELLOW LIGHT HAS SCIENTIFIC BASIS

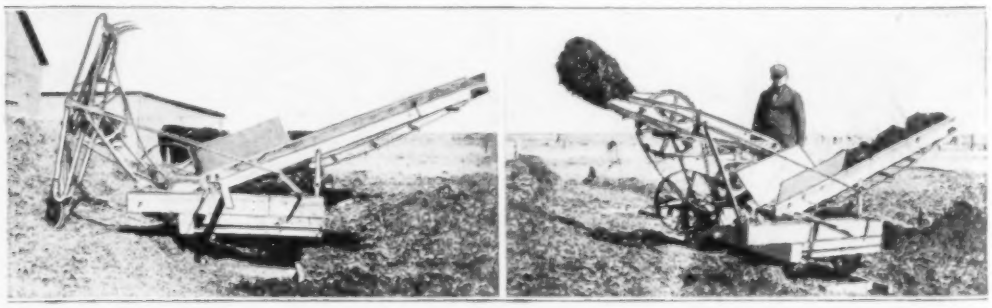
That the general preference for artificial light of a yellowish tint is not a matter of habit, but has a scientific foundation, is the conclusion of illuminating engineers. Recent tests with metal-filament incandescent lamps, gas mantles graded for color, and oil lamps, indicate a greater optical efficiency with the larger number of yellow rays, and an earlier fatigue with blue rays, the candlepower being the same. The effect on the eye was gauged by the blurring of type after steady scrutiny.

CONTROL ELECTRIC MACHINES BY SOUND VIBRATIONS

A novel method of controlling distant electrical apparatus by means of sound waves has just been demonstrated in England. A small motor vehicle, fitted with a local battery and relays tuned to certain pitches, was started and steered by blowing a whistle at distances as great as a mile. The vibrations used, it is stated, need not be audible.

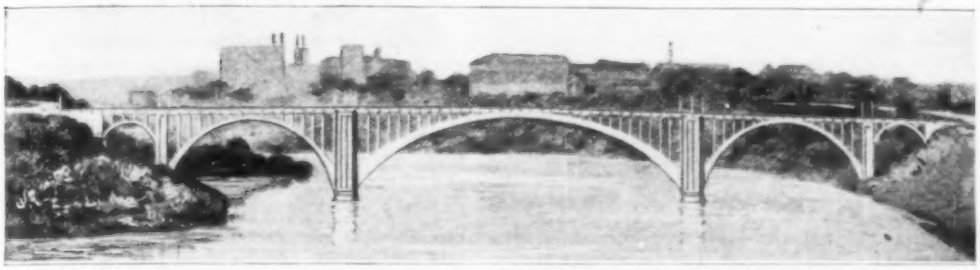
MECHANICAL MANURE LOADER HAS ROTARY PITCHFORK

Fork tines at the opposite ends of a revolving metal frame, pivoted at the center, constitute the main element of a new machine for loading manure and other loose farm materials, designed by a Minnesota inventor. The fork tines, which are adjustable to uneven ground, deposit their load on an elevating conveyor, which in turn discharges it into a wagon. A small gasoline engine operates both the forks and the conveyor. The whole machine is light and easily handled, and the amount of manual labor it saves is considerable.



Mechanical Loader for Loose Farm Materials, Seen Stationary in the Left-Hand Picture and in Operation at the Right: The Double Pitchfork, Pivoted at the Center, Has Adjustable Tines, and Delivers Its Load to the Conveyor

NEW CONCRETE BRIDGE CLAIMS LONGEST ARCH



The Center Span, Declared to Be the Longest Ever Laid in Reinforced Concrete, Measures 400 Feet Clear, the Two Side Spans Being 199 Feet, and the Small Ones 55 Feet Each. The Whole Bridge Is Over 1,000 Feet Long

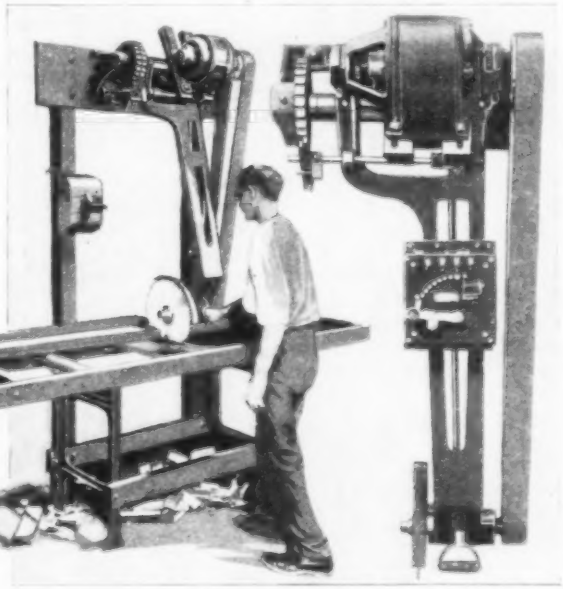
With an arch span measuring 400 ft. in the clear, a reinforced-concrete bridge now being constructed at Minneapolis, Minn., lays claim to the world's record in dimensions of that order. The bridge is 1,032 ft. 7 in. long over all, having, besides the great center span, two of 199 ft. and two of 55 ft. 6 in. An old truss bridge is being used as a working platform in building the structure which replaces it, and the new arch ribs in turn will serve instead of falsework in dismantling the old. Concrete beams and floor slabs are to be precast in units on shore.

FUTURE OF WAR AND MEDICINE DEPENDS ON DYE INDUSTRY

That an intimate relationship exists between the dyestuff industry and the production of explosives is a commonplace to chemists, but a matter to which no popular thought is given. The connection of dyes and drugs is generally known through the efficacy of certain pain-killing powders, which contribute to the vague belief that coal tar is rather a wonderful composition. American scientists now realize, however, that the intricate chemistry of the dye laboratory may well bear the burden of maintaining this nation's future safety. The gases used in modern warfare, as well as the explosives, must come from the dye maker's intermediates. Adrenalin and salvarsan are two necessary drugs whose source in a dye laboratory may not be generally known; and the representative of one institute of chemists has stated that the one hope for amelioration of tuberculosis and cancer lies in the same storehouse of nature's secrets. The logical conclusion is that much of the responsibility for America's preparedness for peace or war rests upon the development of a substantial domestic dye industry.

SWINGING SAFETY SAW LOCKS AWAY FROM OPERATOR

A swinging circular saw now being introduced to the woodworking trade not only swings away from the operator when the handle is released, but locks in that position, so that there is no danger of contact with it while removing the sawed lumber. The electric driving motor is



Saw Frame Swings Away from Operator and Locks Until Handle is Pulled. The Right View Shows the Motor Controller

mounted on the inner side of the swinging arm, opposite the pivot at the top, and its weight acts to throw the arm forward, where it is caught by a ratchet. Pulling the handle of the saw releases the ratchet automatically. The whole frame may be hung on any convenient wall or post, and the motor starter mounted directly on the saw arm.

OPEN VISION SLIT PROVIDED BY DOUBLE WINDSHIELD

An automobile windshield designed to exclude rain, snow, and drafts, without obstructing the driver's view, even by

Side View of the Double Windshield, Showing How the Three Panes of Glass are Arranged in the Two Frames

glass, is being placed on closed cars of a well-known make. Three panes of glass are used. Two of these are pivoted in a slanting frame, while a third is installed at the bottom of a vertical frame back of the other. The frames meet at the front of the roof, and are approximately 10 in. apart on the cowl. By pushing forward the front panes until their edges are separated about 2 in., a vision slit on a level with the eyes of the person at the wheel is provided. When the machine is in motion a vacuum is created between the two sections of the windshield, with the result that air is drawn out of the car body, instead of being forced into it.

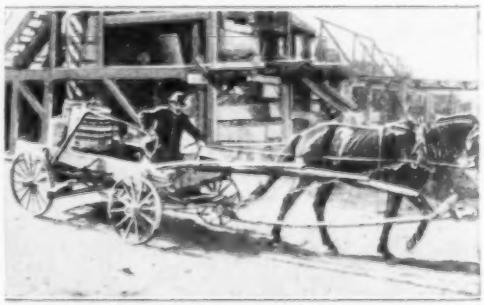
¶ Educators in Japan are planning the establishment of a wild-life experiment station similar to, but probably larger than, the one now being laid out at Syracuse, N. Y., on the system recommended by Theodore Roosevelt.

BRAZILIANS MAKE COMMERCIAL SURVEY OF AMAZON REGION

Trickling coastward from the interior of Brazil, small shipments of vegetable oils, mineral oils, cabinet woods, coal and other minerals, have for years formed the basis of an inconsiderable commerce for the city of Para, called the "Gateway of the Amazon." But busy with its huge exports of Para rubber, the city never made a serious attempt to encourage this miscellaneous and unimportant traffic. Oriental rubber, however, has now usurped the place once held by the Brazilian product, and Para must find other articles of export or see its trade decay. So, up the world's largest river has sailed a party of explorers who will search the innumerable tributaries, and the 4,000 miles of the main stream, for possibilities of commercial development. It is their faith that in the 2,722,000 square miles drained by the river some discoveries surely will be made.

JURY POLE ON WAGON HELPS ESCAPE FROM DESERT

Resourcefulness is a characteristic of the men who go into the desert for gold, and it has saved more than one from a dangerous situation. Recently a prospector had the misfortune to lose one of his two horses by accident. To abandon his wagon of provisions and water would have been suicidal. He ripped off enough wagon siding to make a pole 15 ft. long, when nailed together. One end of this he fastened to the wagon bed; the other end supported the vacant side of the neck yoke. With this improvised rigging, the single horse was able to pull the vehicle, assisted somewhat by the driver, and finally brought the outfit into town in good shape.



Jury Pole Supporting One Side of Neck Yoke of a Two-Horse Wagon, Permitting One Horse to Pull It

NEW YORK DIAGNOSTIC CLINIC

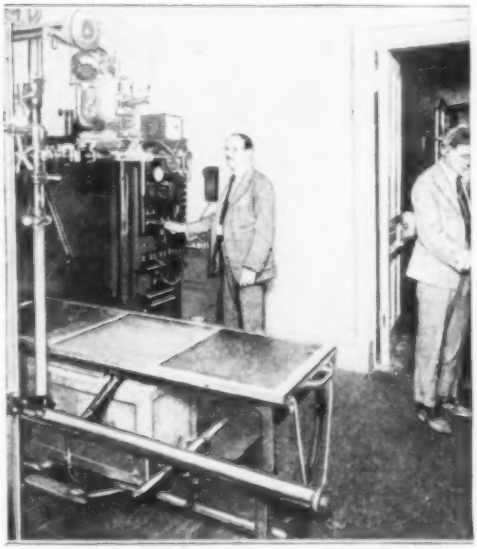
By WILLIAM F. GOODWIN

MANY and varied are the instruments used by specialists in surgical and medical practice, each having such devices as are necessary for his particular requirements. Hence, for a complete examination, a patient may sometimes be under the necessity of going from one doctor to another, which, owing to the expense, is prohibitive to many people. Consequently it was impossible for some sufferers to avail themselves of the benefits of modern inventions combined with the highest surgical and medical skill.

The idea of placing in one building all the instruments and apparatus known for diagnostic use is being carried out by a general practitioner among the working classes of New York. The advantages of such an aggregation for diagnosing human ills is obvious, even aside from the fact that it effects a saving of much time and expense to the patients. The institution has recently been opened, and occupies a five-story building, where there are 20 examination rooms and enough specialists to give attention to those seeking a reliable diagnosis. The work of these specialists is performed at certain hours independently. After their examinations are completed they consult with each other, if, in their judgment, a case requires it. The patient is given a report which sets forth distinctly the nature and extent of the trouble found. Such report may be the opinion of one specialist, or it may embody the result of a conference of the examining physicians who participated in the case. The diagnoses thus obtained may be taken to the family surgeon or doctor to be used as guides for future treatment, for it is not the function of these clinics to interfere with the work

Ear, Nose, and Throat Diagnostic Laboratory: The Instrument on the Stand Is a Special Suction Pump, While the Antiseptic Instrument Case Is on the Right

Dental X-Ray Laboratory: Tube in the Background, with Indicating Apparatus on the Cabinet at the Right



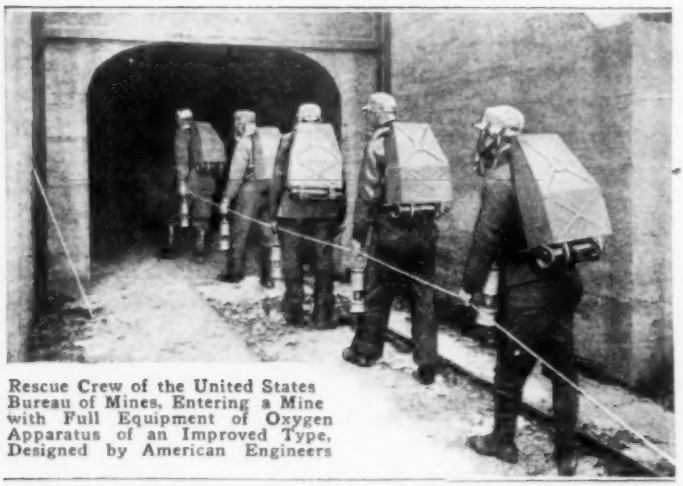
Surgical X-Ray Laboratory, Equipped for Stereoscopic Exposure and Study: The Electrical Apparatus Is 7½ Kilowatt

of the regular practicing physicians, but to furnish complete diagnoses upon which future action may be based.

Some persons are so constituted that an accurate record of the action of the heart is almost impossible to make, especially when they are aware that that organ is being tested. To overcome this difficulty it was found that by placing the electrocardiograph — an instrument for this purpose, described in the June, 1911, issue of Popular Mechanics—in the room below the patient, where he could not see or hear the black monster, at the same time having wires and induction coil leading to the examination table, a correct tracing of the heart action could be obtained.

The many complicated and expensive instruments here in use preclude a detailed description of each, but it may be said that no other clinic in the world is so well equipped for diagnostic purposes. Although this institution has been in existence but a few weeks, the results and benefits thus far shown fully justify it.

AMERICAN EQUIPMENT FOR MINE-RESCUE CREWS



Rescue Crew of the United States Bureau of Mines, Entering a Mine with Full Equipment of Oxygen Apparatus of an Improved Type, Designed by American Engineers

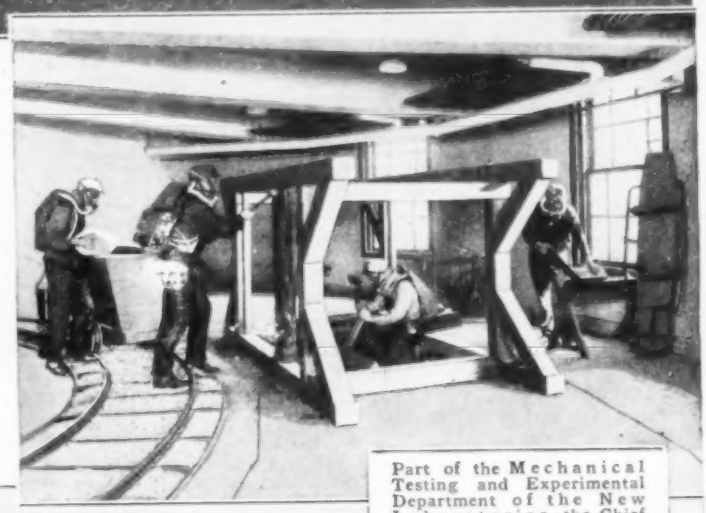
Oxygen mine-rescue apparatus designed by the U. S. Bureau of Mines, and now kept in cars ready for use in every mining district in the country, has proven far superior to the foreign-made equipment formerly used. Thousands of miners have been trained by practice in the application of the apparatus, as well as in other means of rescue, first aid, and safety. In the periodical tests of crews and equipment, gas chambers or "smoke rooms" are arranged to simulate the worst of conditions, and actual explosions of coal dust are caused at the bureau's own mines, devoted to experimental purposes.

As a result of this training, with the use of constantly improved means and methods, it is estimated that fully 5,000 lives have been saved since the bureau was created. There are now about 3,000 fatalities a year from mining accidents, and as many as 250,000 injuries, large and small. It is the aim of the officials to reduce this sinister list at least 50 per cent. Though perhaps the most spectacular, the rescue work is

Physician Examining Each Member of the Rescue Crew as They Emerge from the Mine: This Is a Part of the Periodical Practice Work of the Bureau

New Laboratories of the Bureau of Mines, United States Department of the Interior, Located at Pittsburgh, and Costing More Than $1,000,000

not the chief accomplishment; prevention is the main concern, and the bureau has just dedicated new laboratories, costing over $1,000,000, for the further study of all causes, chemical and mechanical, that contribute to the dangers of the mining industry.



Part of the Mechanical Testing and Experimental Department of the New Laboratories, the Chief Function of Which will Be the Prevention of Future Accidents

An Intentional Explosion of Coal Dust at the Coal Mine Belonging to the United States Bureau of Mines, Where Actual Conditions of Trouble are Artificially Produced for Experimental Purposes and to Test New Equipment

LABORATORY TESTS DETERMINE VALUE OF IMPORTED OILS

Oriental vegetable oils brought into this country through Pacific ports are accepted by consignees only after careful investigation of their value, based on quality, not quantity. Importers maintain laboratories, in which expert chemists analyze samples taken from shipping containers to ascertain the amount of impurities contained in them, including free fatty acids, water, and insoluble particles. Two per cent acid indicates inferior quality, while three per cent means a serious loss in value. As millions of dollars are expended annually for imported oils, the tests are instrumental in saving enormous sums of money. Among the oils examined in this manner are those made from soy beans, cotton seed, coconuts, rape seed, and peanuts.

A Laboratory Test: Skilled Chemists Determine the Value of Different Shipments by Careful Analyses Which Reveal Their Quality

Gathering Samples of Oriental Vegetable Oils: Long Tubes are Thrust into the Cans for This Purpose. The Picture was Taken on the Docks of a West-Coast City

GERMAN NATION'S NEW EMBLEM IS MILD ONE-HEADED EAGLE

Germany has officially adopted a new national emblem, from which all trace of Hohenzollern influence has been effaced. The design is a one-headed eagle in black, against a field of golden yellow. The crown and collar of the old device, symbolic of imperialistic domination, are wholly lacking, and the attitude is tranquil. The only sinister suggestion in the new escutcheon is the vivid red of the bird's talons, beak, and tongue.

COMPOSITION AIR PROPELLERS MAY RIVAL WOODEN "STICKS"

Airplane propellers, formed of many layers of canvas bound together by a well-known synthetic condensation product of carbolic acid and formaldehyde, are said to have been used by several contestants in the recent New York-Toronto Air Derby. This report of the successful use of a nonwooden propeller is certain to interest the aeronautical engineer. For years he has been devising elaborate precautions to check the tendency to split, warp, and crack found in every laminated-wood propeller. He has come to regard it as axiomatic that no part of the airplane gives more consistent trouble. The stick made of this composition, on the other hand, is free from all these faults, being a practically homogeneous mass of high tensile strength. It is at the same time of approximately the same weight as the average wooden "prop." Possessing these advantages, its development in the next few months will be watched with interest.

SHIPWORMS ASCEND PANAMA CANAL WITH SALT WATER

The heavy piling and timbers placed several years ago in Miraflores Lake by the engineers of the Panama Canal Zone were not creosoted. The lake was then a fresh-water body and the ravages of the shipworm, or sea borer, were not feared. But with the gradual infiltration of ocean salt the destructive little animals have arrived in force and have done considerable damage. A typical cross section from an affected log is shown in the illustration. This log was formerly part of the cribwork at the end of Miraflores Lock.

View of the Tramway Which Links Together the Departments of the International Lumber Mill, Looking toward Canada: The Boundary Line is Located near the Light Support under Which the Man is Standing

INTERNATIONAL LUMBER MILL ESCAPES PAYMENT OF DUTY

Legislation placing a heavy export tax on unsawed logs shipped from British Columbia has resulted in the establishment of a lumber mill which operates on both sides of the line between the Canadian province and the state of Washington. Before the law went into effect, the entire plant was located in the latter state, 200 ft. from the boundary, but raw material was obtained from the other side. When it was realized that the new duty would make the mill unprofitable, situated as it was, steps were taken to internationalize the business. The sawmill was moved across the line, while the planing mill and yard were left on their original sites. A tramway was built to connect the departments, so that timbers sawed in Canada could be moved into this country, finished, and stored. This arrangement obviates the payment of the export tax, as none is imposed on sawed lumber.

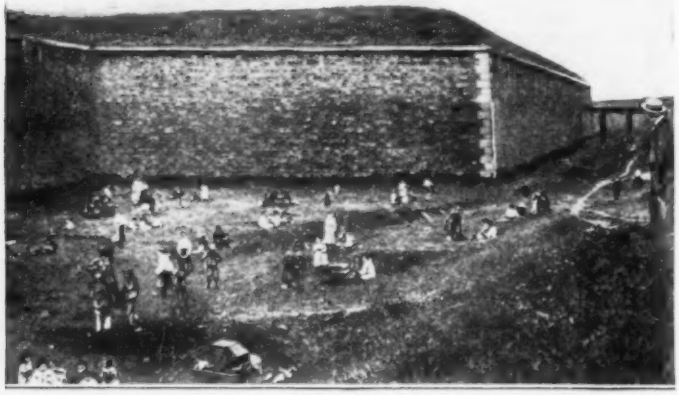
AUTO CRUSHED BETWEEN CARS BUT OCCUPANTS ESCAPE

Caught between two moving street cars, bound in opposite directions, a small passenger automobile was crushed into a hopeless tangle of wreckage in a western town a short time ago, but the four persons riding in the vehicle miraculously escaped injury. One of the cars was forced from the track by the accident, which, needless to say, created a great deal of excitement.

The Four Passengers in the Wrecked Automobile, Shown between the Two Street Cars, Suffered Only from Fright in the Accident

DEMOLISH ANCIENT RAMPARTS AROUND PARIS

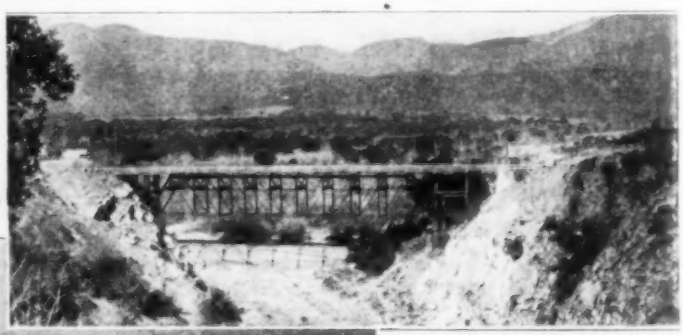
Once considered an impregnable defense against the strongest enemy, the now obsolete fortifications surrounding Paris are being destroyed to provide ground on which dwellings will be erected to house the rapidly increasing population of the city. Great ramparts of earth, reinforced with stone walls on both sides, are the most important features of the system. These are supplemented by moats, most of which have been filled. An enormous amount of money was expended to construct the barricades, which were built in 1841-46. Some of the area made available by the demolishment of the bulwarks will be reserved for public athletic stadiums, though the larger portion will be divided into building lots.



Part of the Defenses of Paris, Now Obsolete and About to be Razed So That the City can Expand: The Grass-Covered Tops of the Massive Ramparts have been Used as Picnic Grounds

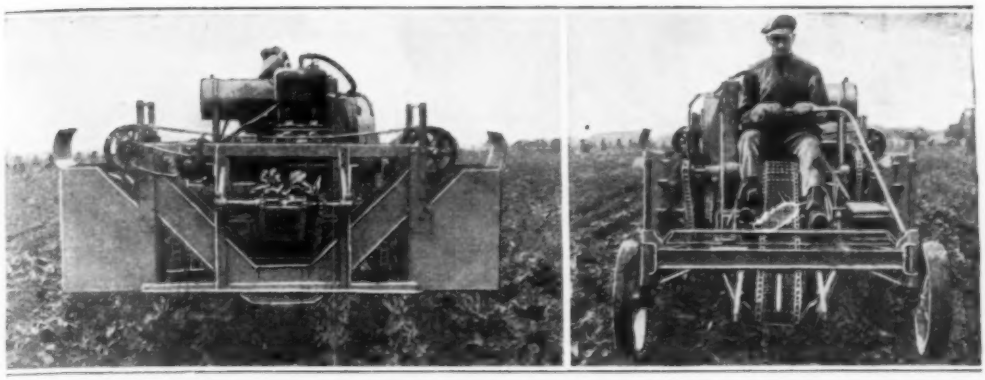
GREAT DAM WILL REMOVE FLOOD MENACE

A huge $300,000 dam will soon stand sentinel over 36 square miles of California watershed. Natural conditions favor the project remarkably, for Devil's Gate, which drains all the near-by mountain area, offers a natural site, with a sturdy granite floor that will easily support the concrete and rock construction. Measuring 310 ft. across the top and 130 ft. in height, the structure will impound a lake of 6,557 acre-feet, or over 2,000,000,000 gal., of water, during the rainy season, thus ridding Los Angeles and Pasadena of the yearly flood menace, and fitting many acres of arid land for agriculture. An attractive park will relieve the barrenness of the shores, while a hydroelectric plant below the dam will furnish valuable power. The top of the dam will bear a 20-ft. roadway and two 5-ft. sidewalks, adding a serviceable bridge to its other improvements.



The Narrow Rocky Outlet Which will Hold the New Dam

Dangerous Floods Gather Quickly in This Vast Treeless Watershed. Along the Hills in the Background will Run the Shores of the Artificial Lake in Which the New Dam will Impound More Than 2,000,000,000 Gal. of Water during the Rainy Season



Motor-Driven Beet Harvester: Left, Rear View Showing Topping Device, Bins, and Conveyor to the Latter; Right, Front View, Indicating the Method of Steering with a Tiller, and the Chain Conveyor Which Carries the Beets to the Rear

NOVEL BEET HARVESTER DIGS, TOPS, AND LOADS BY MOTOR

Sugar beets are dug, topped, and loaded in record time by a new power-driven machine, whose gasoline engine propels as well as operates it. The driver's seat is in front, and a tiller takes the place of a steering wheel. The beets are lifted out of the ground by a fork, thrown on a chain conveyor, and carried to the rear, where the tops are removed. Another conveyor takes them to the bins, which hold the product of one acre. Three acres are harvested, it is claimed, in the time it takes 10 men to work one acre.

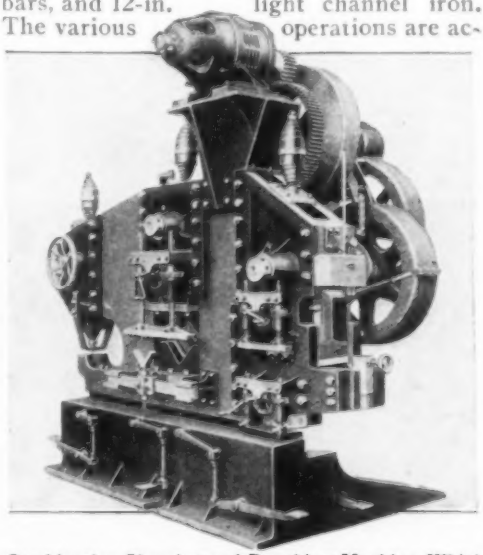
GREAT OCEAN PORT IS PLAN FOR CITY OF DETROIT

Municipal warehouses for package freight, handling and storage facilities on the water front for large shipments of anthracite coal, and public wharves available to all ships, are among the features of a comprehensive plan to make Detroit, Mich., a great ocean port. Improvement of the St. Lawrence-Great Lakes waterway by the United States and Canada will eventually send much ocean shipping through the Detroit River, and the "City of the Straits" is determined to grasp the opportunity. Creation of an industrial port, for the location of industries along the water front, is included in the plan. The city already owns land on the river which is recommended for use in the initial development.

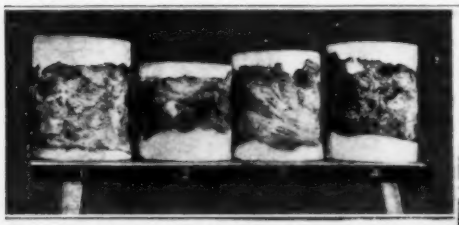
¶Railroad development in the new republic of Jugoslavia will be backed in part by a number of American financiers.

FIVE METAL-WORKING UNITS IN ONE HUGE MACHINE

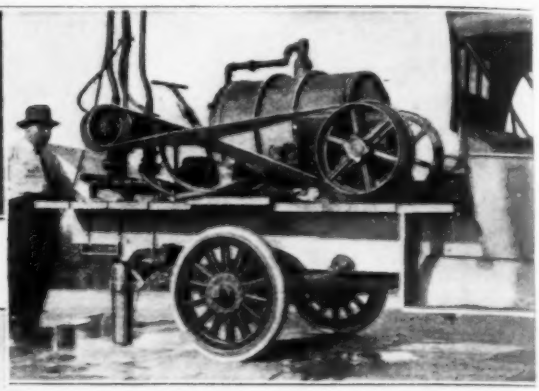
A shear for splitting steel plates, one for cutting round and square bars, a section cutter for structural shapes, a coping and notching cutter, and a punch press are combined in one huge machine just announced by a large manufacturer. In its largest size this combination tool weighs 55,000 lb., occupies 1,400 cu. ft. of space, requires 25 to 35 hp. for its operation, and cuts 1¼-in. plates, 3-in. bars, and 12-in. light channel iron. The various operations are accomplished by three separate cutting heads, with ample room for each operator. All gears and overhanging members are out of danger at the rear.



Combination Shearing and Punching Machine, Which Performs Five Different Operations with Three Cutting Heads, Enabling Work on Structural Pieces to be Completed in One Place



The Portable Testing Drill Cuts from the Pavement the Cylindrical Samples Shown Above. These are Carried to the Laboratory and Tested for Thickness and Wearing Qualities



The Drilling Outfit Shown Above is Powered by a Three-Horsepower Engine, and Cuts a Cylinder 4½ Inches in Diameter from the Average Pavement in About 10 Minutes

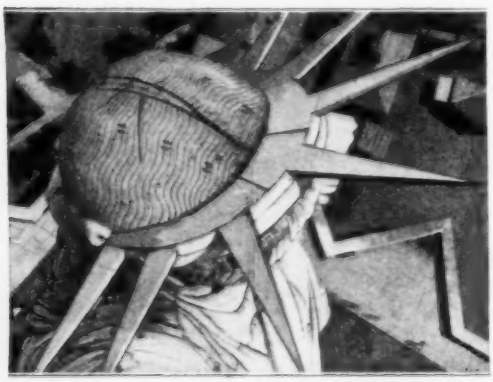
The Drill, Engine, and Gasoline Tank are Seen Mounted on the Light Auto Truck Which Conveys Them Quickly to Desired Locations

SAMPLES CUT FROM PAVEMENTS BY PORTABLE TESTING DRILL

To test finished pavements for thickness and general quality, the California Highway Commission employs a drilling outfit mounted on a light motor truck. Rotated by a 3-hp. gasoline engine, the drill cuts from the pavement a sample cylinder 4½ in. in diameter. A number of these cylinders, taken at intervals along the new highway, are then subjected to laboratory tests which show with considerable accuracy the average thickness and compressive strength. The very operation of drilling, however, furnishes valuable indications of the wear-resisting qualities. Thus, while concrete pavement made of ordinary materials yields a sample in seven to ten minutes, at least half an hour is required for an aggregate that is hard and tough. The time taken in extracting each sample is recorded, in consequence, and later filed with the laboratory data.

STATUE OF LIBERTY FOUND WEARING SOLDIER HELMET

The cheers evoked by the Statue of Liberty from every troop transport that lately steamed up New York Bay would have rung still louder had the homecomers known that the "lady" wears a "tin hat" like any fighting Yank. The fact was not learned, however, until recently a seaplane flew low above the statue and a photographer snapped this close-up of the historic landmark.



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This Airplane View of the Statue of Liberty, Designed by a Frenchman, Suggests a Resemblance to the "Tin Hats" Worn by Two Million American Defenders of French Liberty

BUENOS AIRES RADIO STATION TO BE ONE OF LARGEST

Buenos Aires, the South American metropolis, is to have one of the most powerful wireless-telegraph stations in the world. Construction has already been started on the new plant, which is being built by a New York concern. It will have an effective sending radius of several thousand miles, and will be used especially for commercial communication with New York. Stations for direct communication with Spain are also being seriously considered by the Argentine government.

THOUSAND EMPLOYES HOUSED IN SINGLE BIG DWELLING

Industrial housing, a term which has come into common use in the last few years, is generally understood to signify a large number of similar dwellings, each accommodating a small group of workers. This arrangement has been decidedly varied by a large auto-manufacturing concern in Michigan. The hotel or clubhouse plan has been adopted, and construction has begun on a seven-story building to cost about $2,500,000. This will afford sleeping room for 1,168 men, and a total of 1,300 can be fed. A well-equipped gymnasium, 72 by 92 ft.; a 25 by 75-ft. swimming pool, and a dozen bowling alleys in the basement will carry out the clubhouse idea, and there will be barber shops and Turkish baths for further service. A 1,300-seat auditorium will be an important feature.

EXPERIMENTAL STREET LAMPS ADORN CITY BOULEVARDS

For several blocks along one of Philadelphia's great boulevards may now be seen 12 experimental street lamps which are at once efficient in operation and remarkable for a classic beauty of design. Placed on a concrete safety island in the center of the boulevard, each lamp is raised 14 ft. from the pavement by a slender column of bronze. The lamp itself is designed to produce a maximum of illumination both downward and outward.

¶ Rats and mice are multiplying to an alarming extent in Belgium because of the scarcity of cats. As a result the tiniest kitten can be sold for a dollar.

CARPET-SCRUBBING MACHINE CLEANS THEM ON FLOOR

A machine that looks like a good-sized vacuum cleaner, but which carries

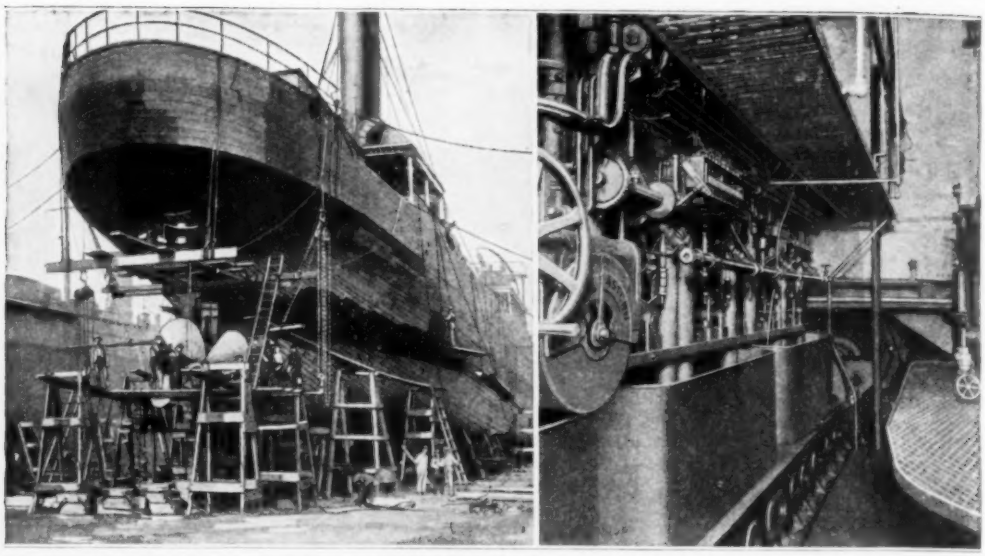
Bottom View of Machine, in Which the Two Brushes of Sponge Rubber Are Visible: The Soap-Compound Container Occupies the Rear

Machine with Oscillating Brushes of Sponge Rubber, Electrically Driven, Scrubs Carpets on the Floor with Soap Compound, Restoring Their Colors

a large can of soap solution in place of a dust bag, is the latest contribution to easy house cleaning. The forward end of the machine holds two scrubbing brushes of sponge rubber, and an electric motor oscillates these vigorously 500 times a minute, while the cleaning compound is fed onto them. The result is that the carpets are nicely cleaned on the floor, and their colors restored.

FAMOUS NOVA SCOTIA VILLAGE HAS ALMOST DISAPPEARED

Immortalized by Longfellow in his famous poem "Evangeline," the village of Grand Pré, Nova Scotia, has almost been obliterated by time. Here and there are evidences that houses once stood on the site, but for the most part these are so slight that they can scarcely be called ruins. Part of the foundation of the church—where, according to the poet, the men Acadians were trapped by British soldiers in 1775—is still to be seen. Picturesque willow trees, supposed to have been planted by the inhabitants of the town before their deportation, have grown to immense size in a meadow which once was dotted with dwellings.



The Process of Installing a Propeller and a New Rudder in a Sailing Vessel, as Part of the Work of Motorizing It, is Seen in the Left-Hand Picture; at the Right, a Big, Modern Oil Engine, is Installed as One of Three Required to Take the Place of the Former Spread of Canvas

CONVERT SAIL-RIGGED SHIPS INTO MOTORBOATS

Sailing vessels are gradually disappearing from ocean shipping lanes, yielding their places to less picturesque, but more efficient craft, propelled by mechanical means. This process has been hastened during the last few years by the conversion of many former wind-driven ships into motorboats. The method by which this is accomplished is very simple. Sail-rigged vessels are placed in dry dock, where they are equipped with oil-burning engines and screws. Their masts are unshipped and scraped, repainted, and overhauled before they are again put into commission.

Old Sailing Ship, the "Spica," a Tramp for 41 Years, Now About to be Modernized and Equipped with Engines and Propellers, After Which It will Enter the Shipping Trade as a Freighter in Competition with New Steamers

¶ Time will turn back three centuries in Plymouth, England, next September when the good ship "Mayflower" once more sets sail. The 180-ton ship, a faithful reproduction of the immortal original, built for motion pictures, is to play an impressive part in the Pilgrim tercentenary pageant.

FIND GOVERNMENT USE FOR STAMP BY-PRODUCTS

By-product utilization has been developed to a high degree by the Bureau of Printing and Engraving, where even the tiny paper disks punched from sheets of stamps by the perforating machines are saved and marketed. An almost unbelievable quantity of these is produced. Four barrels, each containing over 340,000,000 disks, are filled daily. This represents the material removed from 125,000 sheets, each containing 10,920 holes, and 400 stamps, or a total of 1,365,000,000 disks. If the disks were placed on a line with their edges together, they would extend a distance of 863½ miles. Worn paper money also is handled by the bureau. This is reduced to a pulp by boiling in a chemical solution, and the pulp is sold to paper manufacturers in various parts of the country.

Stamp-Perforating Machines in the Bureau of Printing and Engraving: On the Floor can be Seen the Paper Disks That are Collected and Sold. The Daily Output Is Four Barrels, Representing Material Removed from 125,000 Sheets of Stamps

FRENCH SHEEPMEN USE STILTS WHILE TENDING FLOCKS

Stilts are not children's playthings to the picturesque shepherds of southwestern France, but practical utilities which make it possible for them to follow their flocks into the great pine forests of the region during the winter months, when heavy rains keep the dense vegetation beneath the trees in a drenched condition. Equipped with wooden legs, the sheepmen stride through the water-soaked undergrowth, in some places nearly as high as a man, without wetting their clothing. Each one carries a long staff, against which he leans while his charges graze, and knits socks, using yarn spun with wool gathered from the bushes that have torn it off the coats of the many animals under his care. This material usually is collected during the dry season, when stilts are not necessary. The extraction of resin and turpentine from the trees of the forests forms the other major industry of this part of France.

French Shepherds Testify That There Are Tricks to All Trades, by Spinning Much Valuable Yarn, as at the Left, with the Wool Gathered from the Bushes on the Grazing Lands. The Stilts, at the Right, Are Essential during the Wet Winter Months

EX-KAISER LABORS IN EFFIGY BESIDE WATER WHEEL

If the former ruler of Germany could visit a certain town in Maine he would

As the Water Wheel Revolves, the Figure Representing the Ex-Emperor of Germany Moves as if Hard at Work

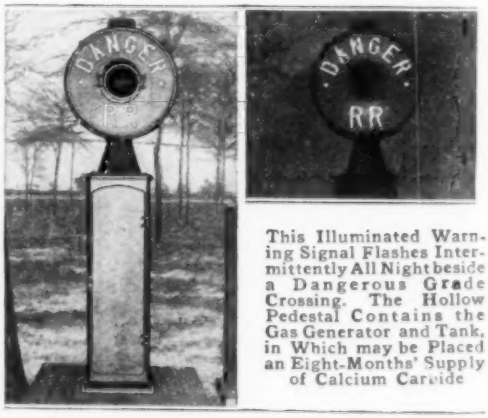
discover what one person, at least, believes proper punishment for the unenviable part he played in the world war—an indefinite sentence at hard labor. Seated beside a small water wheel which furnishes power for a private electric plant, a life-size effigy of the ex-kaiser appears to be turning the wheel with a crank to which its wooden hands are attached. The figure was made and installed by the man who has charge of the wheel.

PISTONS OF MAGNESIUM PROVE VALUE IN AIRPLANE ENGINES

Magnesium is, next to silicon, aluminum, iron, and calcium, the most common of metals; yet it has heretofore gained popular fame solely as the chief ingredient of flash-light powder. Now, however, with the war-time development of a cheap electrochemical method of extraction from the ore, American experimenters are promising many uses for alloys containing magnesium as a major element. One great industrial laboratory has actually built and tested, in a six-cylinder airplane engine, a set of pistons and connecting rings of this material. Used in this way, as a reciprocating mass, its light weight (approximately 40 per cent less than that of aluminum) has resulted in a 10-per-cent gain in engine efficiency. Its other characteristics—strength, good wearing qualities, and high heat conductivity—also promise interesting developments in this field.

ILLUMINATED SIGNAL FLASHES WARNING TO DRIVERS

Railroad grade crossings are dangerous at all times, but especially so at night, or in stormy weather, when ordinary warning signals are passed unnoticed by the average driver of an automobile or other vehicle. One of the latest devices for preventing nocturnal accidents at such points is a sign which is illuminated intermittently by an automatic mechanism operated by acetylene gas. The letters of the sign are cut in a round metal box, 30 in. in diameter, which is mounted on a hollow pedestal containing the gas generator. In the center of the box is a red lens, which is lighted simultaneously with the letters. Usually the mechanism is adjusted to provide 60 flashes of light a minute, but this can be varied. The lamp consumes less than 1 cu. ft. of gas in 24 hours. An eight-months' supply of calcium carbide,

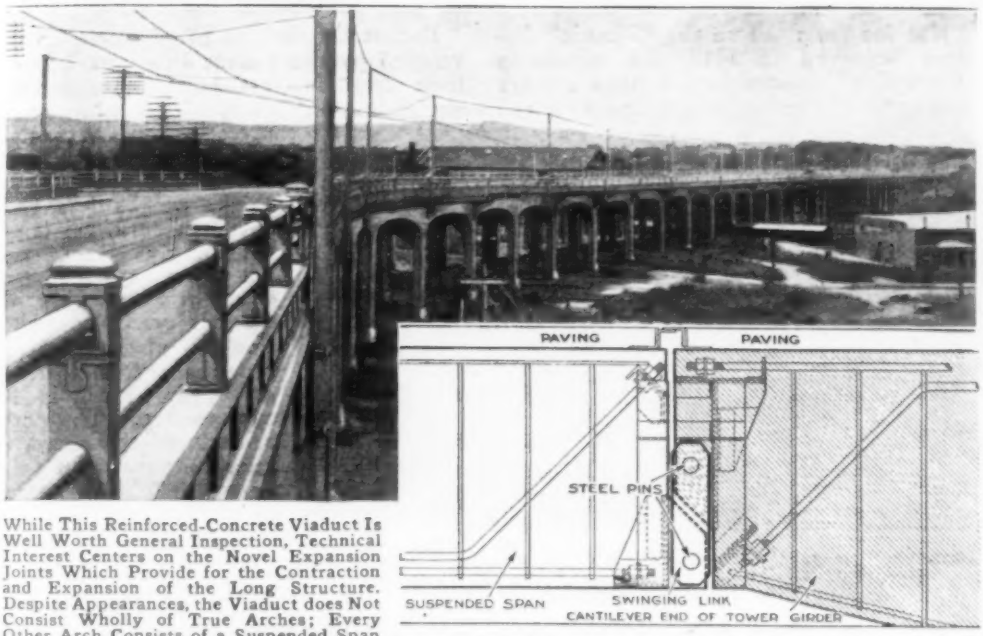


This Illuminated Warning Signal Flashes Intermittently All Night beside a Dangerous Grade Crossing. The Hollow Pedestal Contains the Gas Generator and Tank, in Which may be Placed an Eight-Months' Supply of Calcium Carbide

from which the gas is derived, can be stored in the generator tank.

¶ To test its fitness for the market every consignment of preserved-food products imported into Argentina is now sampled and subjected to chemical analysis.

CONCRETE VIADUCT HAS NOVEL EXPANSION JOINT



While This Reinforced-Concrete Viaduct Is Well Worth General Inspection, Technical Interest Centers on the Novel Expansion Joints Which Provide for the Contraction and Expansion of the Long Structure. Despite Appearances, the Viaduct does Not Consist Wholly of True Arches; Every Other Arch Consists of a Suspended Span Held between the Cantilever Ends of the Tower Girders. The Heavy Pin-and-Link Suspension is Explained in the Diagram at the Right. Each Suspended Span Is 20 Feet Long

With nearly a mile and a half of reinforced-concrete structure to be provided for, the new Colfax-Larimer viaduct at Denver, Colo., offered a difficult problem in connection with expansion and contraction caused by heat and cold. The difficulty was complicated by the condition that the structure is in effect two viaducts, one carrying Colfax Avenue and the other Larimer Street. These intersect 35 ft. above the ground at an angle of about 30°, and are bound together as one structure.

The viaduct has the appearance of a series of flat concrete arches with an average span of 40 ft. Alternate spans are true arches, as they seem, while the intermediate spans are transformed by the expansion joints into cantilevers, with true cantilever arms and suspended spans. The expansion device is a heavy steel plate that acts as a swinging link, placed at each quarter point of the arch and leaving a suspended span of about 20 ft. The link is suspended from a 2-in. steel pin passing through the steel reinforcing of the cantilever arm, and, in turn, it supports the suspended span by a similar arrangement. In this way complete freedom of adjustment in length due to changes in temperature is provided. The expansion joint is covered by a steel plate painted to resemble concrete, effectively concealing it.

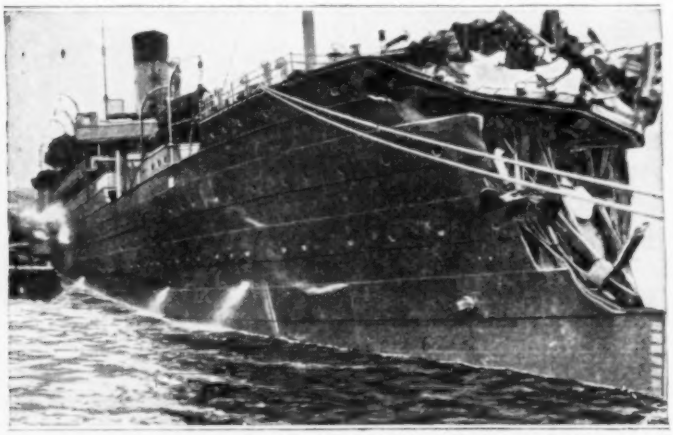
The Larimer Street viaduct, 2,860 ft. in length, connects the business district with the railroad yards. The Colfax Avenue viaduct has a length of 5,859 ft., with the concrete structure interrupted near the west end by a steel span over the South Platte River, and is the latest of five viaducts built to connect the east and west sections of Denver.

MAINMAST OF FARRAGUT'S SHIP TO ADORN CHURCH LAWN

The mainmast and spars of the "Hartford," flagship of Admiral Farragut in the Civil War, will be erected on the grounds of a church in Hastings-on-Hudson, N. Y., if the plans of the congregation are approved at the New York Navy Yard. The church was founded years ago with the prize money won by Farragut in the capture of Confederate blockade runners. On learning that the old "Hartford" is to be condemned to the scrap heap, the members of the church have consequently been aroused to make every effort to secure this unusual and desirable souvenir.

STEAMER COLLIDES WITH BERG BUT REMAINS AFLOAT

Not far from where the "Titanic" disaster occurred in 1912, the steamship "Grampian" crashed into a huge iceberg recently, but escaped the terrible fate which overtook the great liner. Because of the shape of the berg, whose upper portion overhung the base, no damage was done to the vessel below the water line, though the bow above was crumpled into a shapeless mass of steel by the impact. Two of the crew were killed and several injured. After the collision the ship returned to St. John's, Newfoundland, under its own power.



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Steamship "Grampian" after Colliding with an Iceberg off the Coast of Newfoundland: No Damage was Done below the Water Line, So the Vessel Returned under Its Own Power

TEXTILE INDUSTRY TO USE NEW AMERICAN COLORS

Like a "declaration of independence" from German domination of the dye industry, comes the announcement that next spring will see on the market 78 new and staple shades, all "made in America." Germany's best showing is beaten, it is believed, by this large array of colors. Among these new shades which are to gladden the heart of the American woman of fashion are "date," an Arabian golden brown; "sponge," a brownish ocher; "musketeer," a dark blue-green; "middy," a scintillating navy blue; "eagle," a shade of brown; "aztec," a yellowish brown; "aero," an atmospheric blue; "firefly," a red and orange; "cinder," a gray; "scarab," a bluish green; "Venice," a turquoise blue; and "rosebud," a brilliant pink.

WOVEN FACES AND CORRUGATED CORE FORM NEW PLYWOOD

Recent discussions of plywood, as developed by the Forest Products Laboratory, lend interest to another strange composition now under investigation. A sample of this new board, 8 in. square and about 3/16 in. thick, weighs less than so much cork, yet is astonishingly rigid, and has been proved free from shrinkage. Its value for air-craft construction is obvious. More remarkable than its properties, however, is its construction. The core, or body of the board, is seen to consist of thin, corrugated, or "wavy," plywood. Inclosing this core are two faces, each about 1/32 in. thick, and each formed of many strips or ribbons of wood, 1 1/4 in. wide, which weave under and over each other in checkerboard fashion. Casein glue holds in its rigid grip the many components of this odd plywood.

ALASKAN MOTORIZES HIS SLED WITH BICYCLE POWER WHEEL

By attaching a bicycle motor wheel of familiar type to his simple sled, an Alaskan voyager has opened a speedier way for himself across the snow, and discarded his dog team. The wheel is rimmed with toothed steel instead of rubber, and its depth is regulated by a slotted iron arm. The rider stands at the back, with all controls on the dash before him.

Motor Wheel That is Replacing One Alaskan's Dog Team: The Slotted Iron Arm Regulates the Depth of the Wheel Which is Shod with Toothed Steel

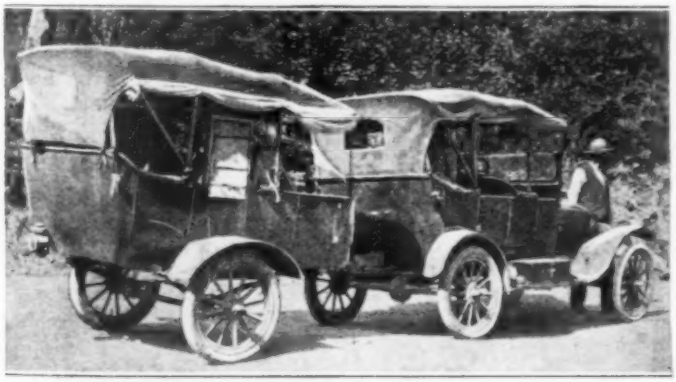
MOVE THREE-STORY BUILDING OF BRICK AND CONCRETE

Office workers went about their tasks as usual in a three-story 3,000-ton brick and reinforced-concrete building at Detroit recently while the structure, 60 by 95 ft. in plan, was moved 450 ft. across a vacant lot and a street to a new foundation, a feat declared to be without precedent. The building was raised with jacks and placed on steel beams, which in turn rested on heavy cross timbers. Hardwood rollers between the timbers and supports underneath allowed the ponderous mass to be pulled by two electrically operated winding drums, equipped with strong steel cables. Telephone and electric service were maintained while the operation was in progress, and the building arrived at its new location in good condition, showing little evidence of its unusual performance.

Moving a 3,000-Ton Three-Story Brick and Reinforced-Concrete Building: In the Foreground Is One of the Electrically Operated Winding Drums Used for Pulling the Structure, Whose Occupants Were Not Disturbed by the Transmigration

OLD AUTO BODY CONVERTED INTO CAMPING TRAILER

Lack of a serviceable engine does not render an automobile useless. This was demonstrated by a western motorist recently when he removed the body of an old touring car from its chassis, mounted it on the rear wheels, and attached the cart thus formed behind a new machine. Camping equipment can be carried in the improvised trailer, or it may be converted into sleeping quarters by the installation of a mattress and springs.



Camping Trailer Made from the Body and Rear Wheels of an Old Automobile: It can be Used as a Bed or for Carrying Equipment

CONDUCT CHILDREN'S BANKS ON CONVENTIONAL LINES

An example of a successful public-school savings-bank system is to be found in Nottingham, England, where the institutions are conducted as far as possible in the same manner as ordinary banks, thus not only adding to their educational value, but creating in the minds of the youthful depositors a feeling that their financial houses are of as much importance as those patronized by their elders. Books in which are kept records of deposits, amounts withdrawn, and balances due are used by the children. Deposits are placed in local banks, and the accounts are audited quarterly. Once each week deposits are received and withdrawal orders paid, teachers acting as tellers. Sums as low as two cents are accepted. There are 104 of the banks in Nottingham, with 15,234 depositors, and with aggregate deposits of $19,128.

Popular Mechanics features will appear in moving pictures issued by Paramount Magazine.

TRAFFIC SEMAPHORE OPERATED BY MOTOR AND CLOCKWORK

An automatic crossing policeman, whose commands are declared to be just as effective as those of a regular traffic officer, has been devised by a Denver inventor. Signs reading "Stop" and "Go," illuminated at night, show at right angles at the top of a pole, which, at intervals, turns one quarter of a revolution, actuated by an electric motor and clockwork in the base. The time period of each position may be adjusted to give the busiest street the longest interval of use. A bell rings loudly before the pole turns. Lighted street names and a four-dialed clock complete the assembly.

LAND-CLEARING METHOD BURNS STUMPS ONLY AT ROOTS

A farmer in Minnesota is clearing his land of stumps by burning out only the roots, after which he topples over the unharmed part above the ground and takes it home for firewood. He believes that the valuable fuel salvaged in this way is ample payment for the effort his method requires. Beside each offending stump he digs a hole, from which he bores a passage, through the roots, to a stovepipe set into the ground on the other side. A fire lighted in the hole soon generates a draft up the pipe, thus sucking the flames through the roots.

From the Pipe a Passage Leads through the Roots to a Hole in the Ground at the Opposite Side of the Stump. Here Burns a Fire Which is Sucked through the Roots and Soon Destroys Them

SPORTSMEN SAIL TO ARRANGE AIR RACE AROUND THE WORLD

"The International Aerial Derby around the World" passed from fancy to fact a few days ago when a special commission, consisting of three famous millionaire sportsmen, sailed from America for a tour of the world. In the important cities of a dozen countries they will confer with the highest aeronautical and sporting authorities regarding routes, landing places, referees, and local organizing committees. Stops at all these cities will be compulsory, only the two transoceanic routes being left to the decision of the entries.

The rules which are to govern the contest are as liberal as they are unusual. As each entrant will be allowed to use as many airplanes or dirigibles as he finds necessary, the contestants will enter the race as individuals, instead of entering their air craft as in the past. Two or more contestants may charter the same air craft for part or all of the journey. In making connections between air craft the competitors will be permitted to use other means of transportation to the extent of 10 per cent of the distance to be traveled. The winners will be rewarded by prizes expected to total $1,000,000 or more.

HOG ISLAND MAY BECOME HUGE TRANSATLANTIC TERMINAL

Hog Island shipyard, the greatest ship-assembling plant in the world, is under option to the corporation that built it, which already owns the land and is expected to take over the entire property. Practically another year will be required to complete the 77 ships still to be built, so its disposal will not be immediate. The plan, however, is to turn the island, whose remarkable facilities were described in Popular Mechanics Magazine for October, 1918, into a great transatlantic terminal, discontinuing its constructive function. Its 50 steel shipways and other equipment cost the government some $60,000,000, besides a six-per-cent rental on a ground valuation of $2,000,000.

¶ Rifle periscopes, consisting of small mirrors in a heavy tin case, may soon be offered on the market as novelties, or accessories in boy-scout drill practice. The Ordnance Department has listed 160,000 of them as surplus material.

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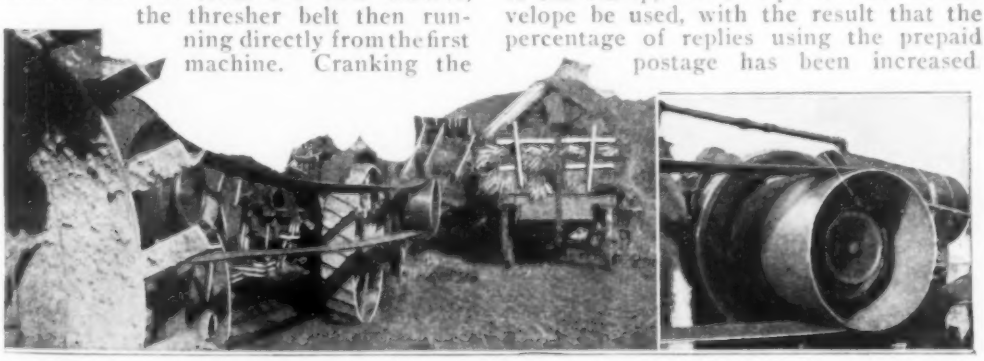
ENORMOUS CALIFORNIA GRANITE QUARRY SUPPLIES THE NATION

CALIFORNIA is noted especially for its fruits and flowers, but the state's products include many other important commodities, little known to the average person. Among these is granite, which is obtained from an enormous and apparently inexhaustible quarry at Knowles, from where it is shipped all over the United States. The stone is extremely hard and durable, and, when polished, its beauty is unsurpassed by any found elsewhere in the country. It is transported in huge blocks, which are roughly surfaced before being placed on freight cars.

TRACTORS BELTED IN TANDEM DRIVE RICE THRESHER

In southern Arkansas rice is quite an important crop, about 6,000,000 bu. being produced. A grower in that district who used a large rice thresher, requiring 35 hp. to drive it, solved his power problem by belting two tractors together in tandem. The tractor nearest the thresher has a flange bolted to its belt pulley to receive the belt from the rear tractor, the thresher belt then running directly from the first machine. Cranking the rear tractor and throwing in the clutch starts the other, which then takes up its share of the load.

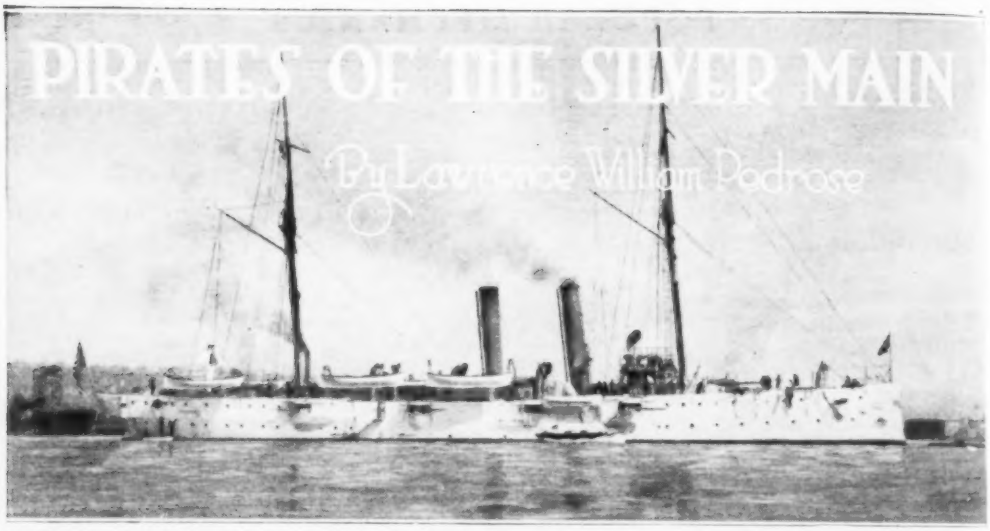
¶ Recognizing the fact that many stamped and addressed envelopes inclosed with circular-letter advertisements are consigned to the waste basket by their recipients, a California manufacturing company prints on the face of these articles a legend calling attention to the stamp, and a request that the envelope be used, with the result that the percentage of replies using the prepaid postage has been increased



In the Foreground at the Left, Two Tractors Belted Together in Tandem, Drive the Rice Thresher in the Background. At the Right Is Detail of Belt Flange Fixed to Pulley of First Tractor, to Receive Drive of Second

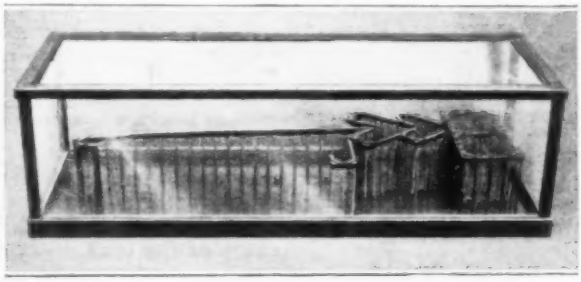
PIRATES OF THE SILVER MAIN

By Lawrence William Podrose



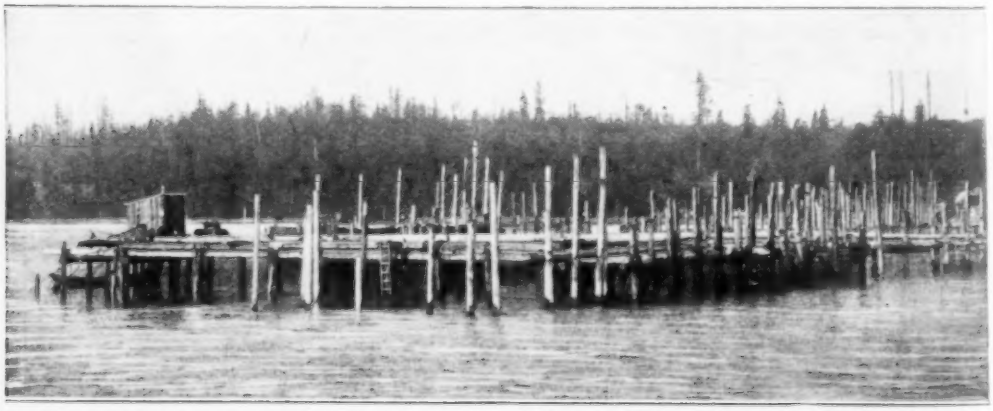
The Gunboat "Marblehead," Which Recently Won the Everlasting Gratitude of the North Pacific Fishermen by Steaming Alaskaward to Clear the Seas of Fish Pirates, Grown Daring and Numerous of Late

RECENTLY the gunboat "Marblehead," returning to San Francisco with a relief expedition which had gone north to fight an epidemic of influenza among the Alaska Indians, received hurry-up orders to sail again for the North to combat organized gangs of pirates who were robbing, on a most efficient scale, the fish traps of the North Pacific. The "Marblehead" proceeded immediately to the vicinity of Juneau, to which place three naval subchasers and a squad of volunteer ex-service men also were dispatched. War on the pirates along the coast was begun, and within a week several of the alleged thieves were rounded up.



Model of a Salmon Trap of the Kind Used in the North Pacific, in Which the Fate of the Luckless Fish Becomes Apparent, as They Follow the Line of Netting into the Maze of Pockets at the Right

Pirates have been a menace to these fish traps for years. Fishing boats have brought down tales of their



The Way a Real Salmon Trap Looks: Not So Neatly Finished as the Model, but Vastly Effective in Stopping the Great Schools of Fish That Go Cruising Down the Coast Looking for a Good Spawning Bed

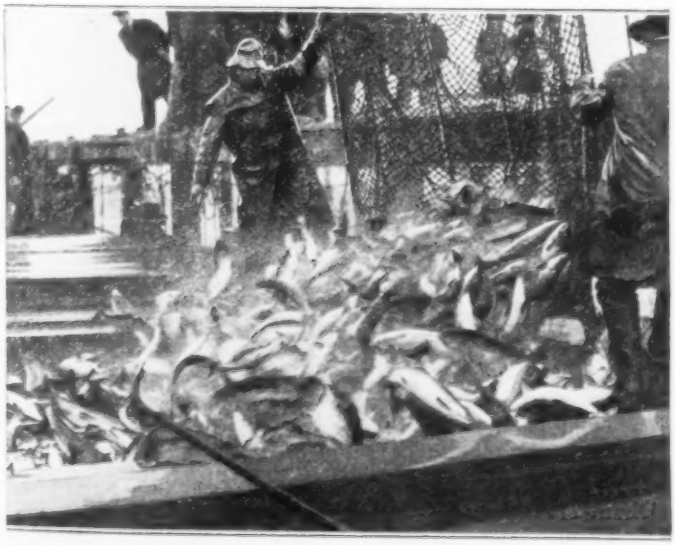
bold depredations all along the coast from the rim of the Arctic as far south as Ketchikan. It evidently is now the government's determination to end this piracy for once and all time.

The salmon runs begin early in July. The first run is followed by another around the middle of August. At every projection of the coast line a trap is located to catch the silver horde as it swims with the Japanese current in search of suitable rivers in which to spawn.

The salmon trap consists of poles, or piling, driven in a line several hundred yards straight out into the water. At the outer end of the barrier, over which galvanized wire or cord netting is strung, is a series of pockets into which the salmon, seeking to swim round the barrier, enter and lose their way. From pocket to deeper pocket the fish dart, finally entering a square inclosure through an aperture which from within appears as a part of the entrapping wall. This last pocket, the one from which the fish are taken, is equipped with a bailing net, which rests on the bottom and is raised regularly every day to clear the pocket.

Because of the large number of traps located along the coast, seldom more than one watchman can be maintained at each trap, and the bailing of the pockets is done by a boat and crew of men who have a string of a dozen to a score of traps to visit in the course of a day's work. These isolated watchmen often fall easy prey to the brazen pirates who, under the cover of darkness, steam up to a trap, overpower the watchman, lift the net, and bail the pocket of its accumulated horde, then proceed to sea again, not to reappear until they find an opening for another "catch."

The Salmon are Loaded from the Traps to the Hold of the Fish Boat by Means of a Portable Conveyor into Which the Fish are Scooped by the Fishermen. The Pirates Become Quite as Expert and Rapid in This Work as the Owners, and Clean Out a Number of Traps in a Day



The Last Pocket in the Salmon Trap Is a Big Square Inclosure, and on Its Bottom Lies a Great Net. When This is Raised, after a Run of Salmon, the Observer Begins to Realize the Extent of the Fisheries Industry, for the Pocket Often Contains More Fish Than Water

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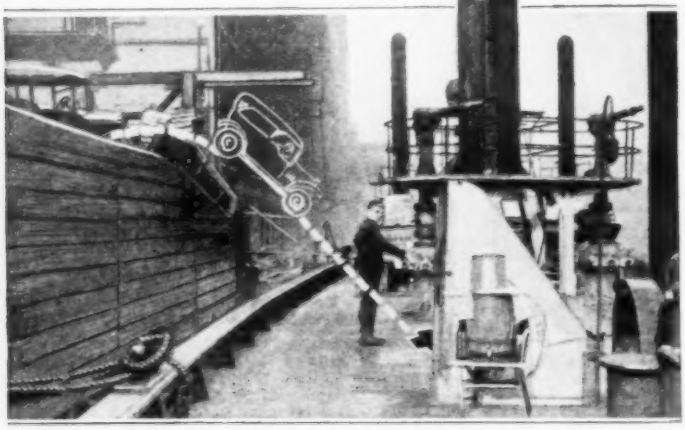
¶ A butterfly "farm" has been started in central France to supply the scientists' demand for the beautiful insects. On mulberry, oak, plum, hawthorn, and other trees and shrubs, the caterpillars are placed to spin their cocoons. These are then confined in little wire cages into which the butterflies emerge. The butterfly "farmer" is also experimenting with many varieties of silkworms in the hope of producing a fine silk in more northerly climates.

AUTO PLUNGES FROM STREET TO DECK OF FIRE TUG

A fire tug intervened to save an automobile driver from death or serious injury in a peculiar accident, caused by unusually careless driving, which occurred a short time ago in a middle-western city. The boat was moored at the foot of a street when the car, running at high speed, plunged into space at the termination of the thoroughfare and alighted on the vessel's deck, about 10 ft. below. Slight bruises were sustained by the motorist, who was alone in the machine. The automobile was completely wrecked.



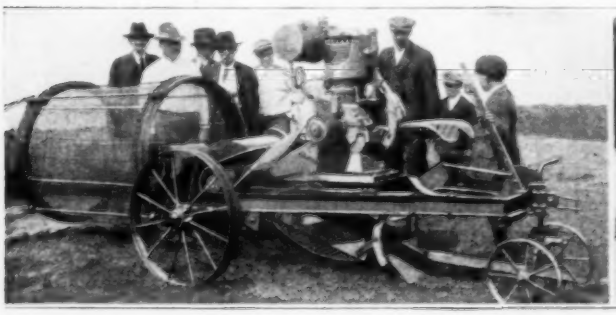
Scene of an Unusual Accident: A Motor Car Plunged 10 Feet to the Deck of a Fire Tug, but the Driver was Hurt Only Slightly

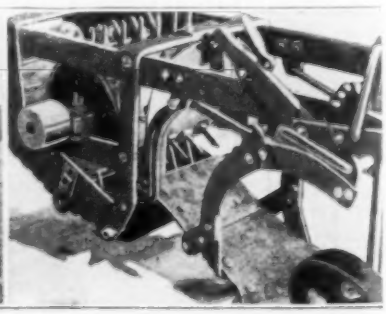
ENGLISH BUSINESS MEN VALUE LONDON-PARIS AIR SERVICE

The daily airplane passenger service from London to Paris and return has now been in successful and regular operation for several weeks. Each day the planes start and arrive at approximately schedule time, though often forced to battle heavy storms. As the reliability of the new service is demonstrated, English business men evince a growing interest, and book more and more space for passengers and freight. Crowded for time, the man of large affairs is finding it increasingly convenient to use the airplane. If he lives in London, an automobile calls at his door and whisks him to the suburban airdrome. Thence the flight to Paris is made in two hours and a quarter if he rides in a small plane like the DH-4, or in about three hours if he cares to share a Handley Page with a dozen others. Those responsible for the new service are hopeful that the arrangements between the British and French post offices will soon permit the carrying of express letters by airplane and dirigible.

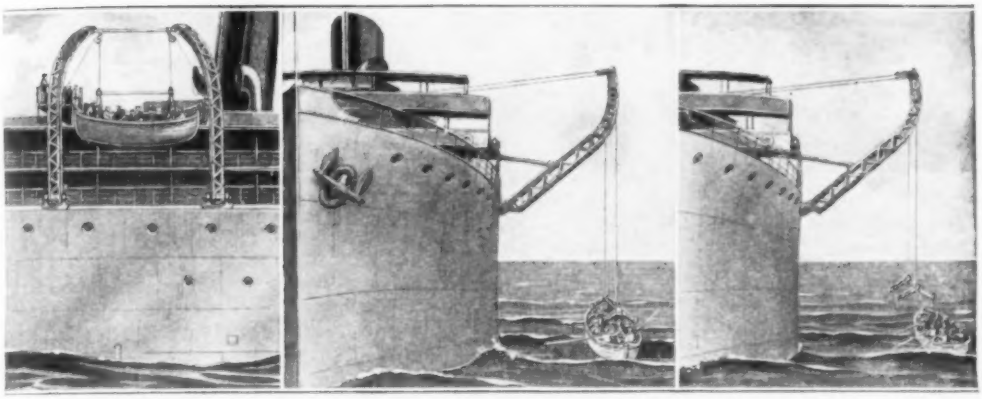
MACHINE ERADICATES WEEDS BY PULVERIZING SOIL

A machine which exterminates weeds in cultivated fields by taking up strips of soil, pulverizing it, and returning it through a sieve, is a late addition to the implements of farming. A flat plowshare cuts a furrow, 16 in. wide and 4 to 6 in. deep, as the machine is drawn by horses or tractor. The ribbon of soil passes over the plow onto a toothed drum, which shreds it and returns about





Weed-Exterminating Machine Which Pulverizes Soil: The Flat Plow Point and Conveyor Are Visible under the Chassis in the Left-Hand Picture and in Detail at the Right. The Rotary Sieve Is at the Rear of the Machine



Left, Side View of Ship Equipped with Lifeboat-Launching Device: The Two Steel Arms are Pivoted on the Rail. Center, the Arms and Tackle Swinging the Boat to the Sea. Right, the Tackle Released from Its Fastening to the Boat, Which It Leaves on an Even Keel and Safely Away from the Ship's Side

60 per cent of the earth to the field. The rest goes on a conveyor to a separating device somewhat like that of a thresher, where 20 per cent more soil is reclaimed. The residue then passes into a big revolving sieve, through which all the dirt falls, while the weeds are hoisted into a conveyor and elevated to a wagon. The machine weeds three to five acres a day.

WOODEN BLOCKS TIED TO FEET TO SAVE SHOE LEATHER

Coconut and other vegetable oils are scattered so freely over many of the docks on our western coast that the leather shoes of the workers are soon corroded and ruined. The photograph shows how the inspector saves his shoes by the simple expedient of tying blocks of wood beneath the soles. Over notches in each block pass cords or straps by which the wooden soles are secured to the feet.

LIFEBOAT-LAUNCHING DEVICE TO PREVENT SEA DISASTERS

Many lives have been lost at sea through the inefficiency of lifeboat-launching apparatus, which, though it requires skilled manipulation, sometimes fails to operate, and frequently dumps passengers into the water, or allows the boats to be crushed by the waves against the side of a vessel. These disadvantages are declared to be absent from a device being manufactured in Canada, in which two long steel arms replace the familiar davits, while steel tackle, operated by hydraulic machinery, supplants the maze of ropes and pulleys now in use. Pivoted on the rail of a ship, the contrivance is intended to lift a lifeboat from an upper deck, swing it free from the side, no matter what the list, and lower it evenly to the water. Three levers on the loading deck control the mechanism. The tackle is fastened to the boat in such a manner that it can be detached instantly by one person.

SPARK-PLUG TESTER INCLOSES WHOLE PLUG IN CHAMBER

For correct conclusions, spark plugs should be tested under working pressure. The difficulty hitherto has been to prevent leakage of pressure around the plug seat. A Chicago inventor cuts the knot by inclosing the whole plug in a sealed chamber, with air-tight electrical connections, a lens for observation, and a pressure gauge. The pressure is maintained until the test is completed.

Spark-Plug Tester Which Incloses the Whole Plug in a Pressure Chamber, with Connections Sealed In: A Lens in the End Permits Observation

Popular Mechanics features will appear in moving pictures issued by Paramount Magazine.

WINDSHIELD SCREEN PREVENTS ENTRANCE OF INSECTS

One by one the discomforts of motoring are being eliminated through the invention of automobile accessories. A recent contribution is a screen for preventing insects from passing under the windshield of a car, but permitting the entrance of air. Fine wire mesh is inclosed in a metal frame, the latter being so hinged that it is pushed into place when the bottom section of the windshield is pulled inward.

The Fine Wire Mesh in This Accessory to the Windshield Keeps Out Insects While Admitting the Air. It is Shown Here in Front and Rear Views

INSULATED AIRPLANE CABIN BECOMES BUSINESS OFFICE

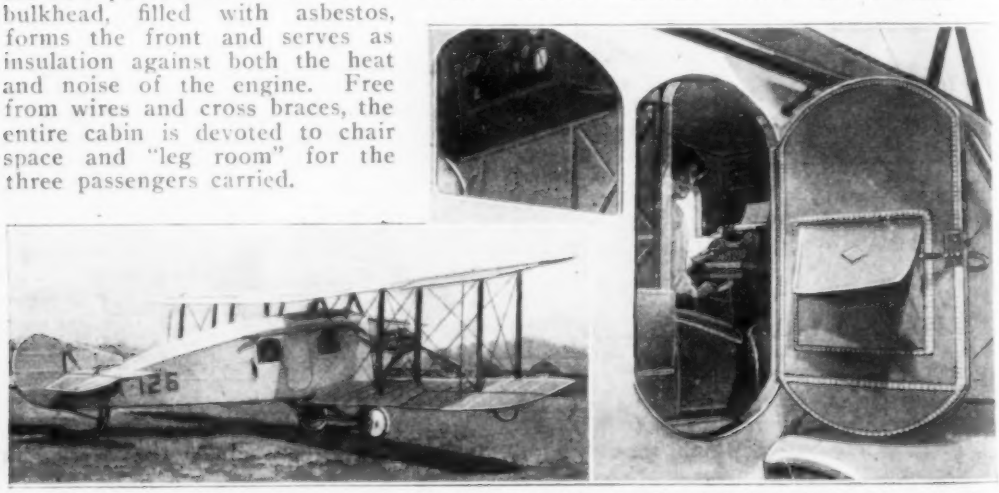
The first public demonstration of a new English commercial airplane was featured by the ascent of a stenographer, with typewriter and notebook, as one of the three passengers. While the roaring 12-cylinder engine pulled the plane through the air at 90 miles an hour, letters were easily dictated and typed in the quiet cabin. The cabin, by the way, is typical of the sort being provided in the new peace-time machines. A double bulkhead, filled with asbestos, forms the front and serves as insulation against both the heat and noise of the engine. Free from wires and cross braces, the entire cabin is devoted to chair space and "leg room" for the three passengers carried.

GERMAN STEAMER "IMPERATOR" KEPT BY UNITED STATES

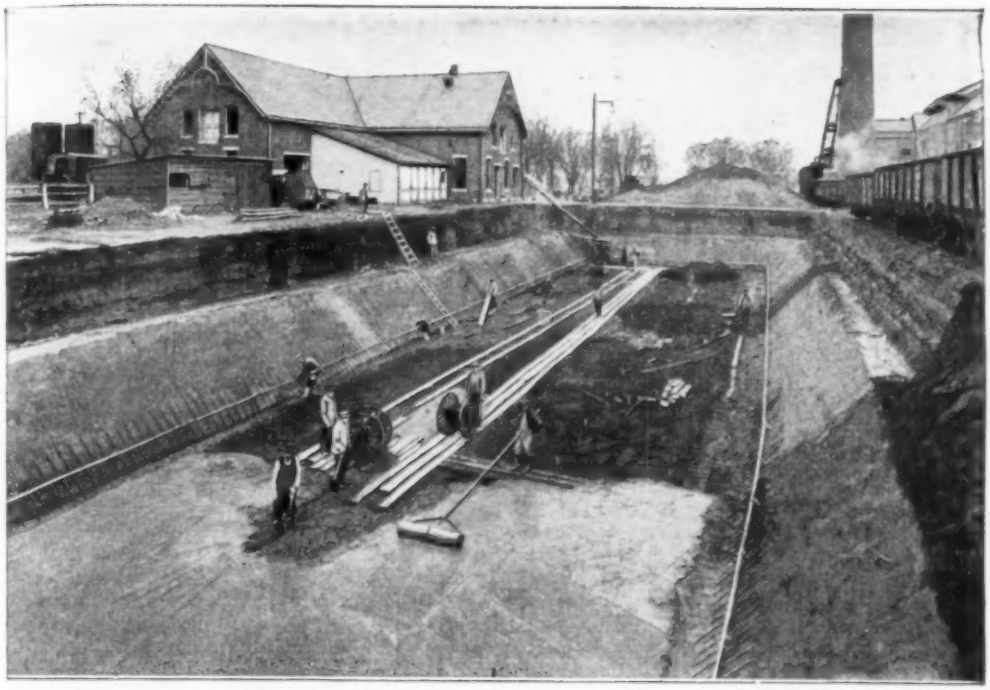
The giant steamship "Imperator," former German liner and second ship in the world in size, is to be kept by the United States, to which it was allocated by the Interallied Shipping Commission, and will be placed in passenger service when repairs are completed. Seven other German ships also are to be retained. The "Imperator" was launched in 1912, and was described in Popular Mechanics Magazine for August of that year. It is 900 ft. long, 96 ft. of beam, and makes 25.9 miles an hour. Its capacity is 4,250 passengers, besides the crew.

LEATHER FROM FISH SKINS BY NEW CURING PROCESS

Fish leather will become a useful and economical covering for books, belts, wallets, novelties, etc., with the commercializing of a new process discovered by a New York inventor. The fish skins are dried, sandpapered smooth, salted, pressed by hot irons between oil-soaked blotters, and then treated by chemicals whose nature is not divulged. The leather thus prepared is tough, durable, and very pliable. Of the varieties of skin experimented with, that of the conger eel gave the best results, the blackfish and common eel claiming second and third place, respectively. Vast quantities of this material go to waste every year when the market fishermen clean their catches.



This English Limousine Airplane Is a Four-Seater Designed for the Use of Business Men. Bodily Comfort Consequently Receives First Emphasis in the Cabin Construction. Upholstery Is Luxurious and Leg Room Ample. A Double Bulkhead Insulates against Both the Heat and Noise of the Engine. At the Right is Pictured the Stenographic Demonstration Which Was a Feature of the First Flight

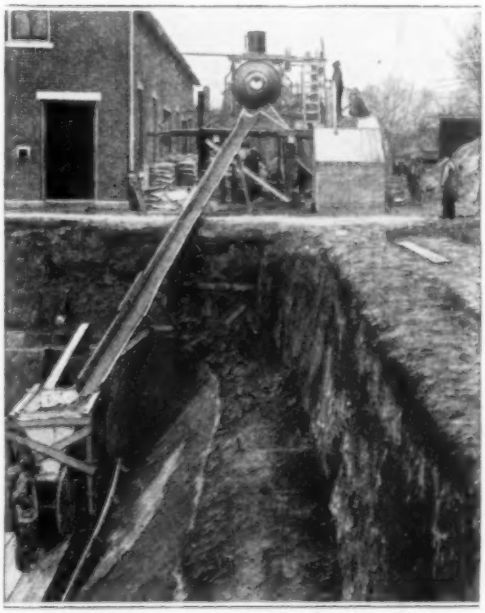


Concrete Pit for Storing Coal under Water: Its Capacity Is 6,000 Tons and It Is 204 Feet Long, 62 Feet Wide, and 18 Feet Deep, Lined with Concrete. In This Picture Workmen are Seen Laying the Concrete Floor

SLACK STORED UNDER WATER IN VAST PIT

By GEORGE F. PAUL

SPONTANEOUS combustion in great piles of stored slack coal has been successfully overcome at Omaha by the building of a great concrete-lined pit where 6,000 tons of coal can be kept under water. This pit holds the fuel for one of the pumping plants of the Metropolitan Water District. It is 62 ft. wide by 204 ft. long at the top, and has a depth of 18 ft. As the site consisted of clay, the greater part of the excavation work was done by the use of a locomotive crane with a clamshell bucket that discharged into a hopper from which the wagons were loaded. Nor is hand shoveling needed in connection with the use of the pit. A locomotive crane with a 60-ft. boom is used to unload the coal into the pit and also to carry it up from the pit and into the boiler room. Freezing in winter can be avoided by draining off water until it is about 3 ft. below the surface of the coal.



The Pit Sides Are Vertical for Eight Feet Down, Then at 45 Degrees, Necessitating the Position of the Concrete Mixer and Chute Seen Here

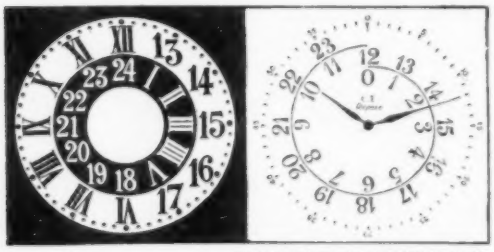
The pit has a concrete floor 8 in. thick, and the sides rise with a 45° slope to a height of 10 ft., the remaining 8 ft. being vertical. The top of the pit is 2 ft. above the ground level. A light galvanized-iron roller was used to spread and finish the floor concrete. By fitting this roller

with a long handle it could be operated by one man and there was no need for anyone to walk over the concrete. The mixer was elevated so that the concrete could be conveyed by gravity into a hopper and thence into two-wheeled buggies used to carry it along board tracks to the points where concreting was going on, while the locomotive crane was kept busy handling the materials, unloading the cars of sand and gravel, and moving the piles so as to shorten the wheeling distance. Thus quick and economical construction was insured.

The pit is expected to pay for itself many times over in the safety secured and the efficiency that it makes possible.

DIVIDE NEW TIMEPIECE DIALS INTO TWENTY-FOUR HOURS

The adoption of the 24-hour system of time measurement in France has resulted in the production of several novel de-



BY COURTESY OF THE JEWELERS' CIRCULAR

Left, 24-Hour Clock Dial with Black Field for the Night Hours, and White Field for the Day. Right, a Spiral Arrangement of the Numerals

signs for watch and clock faces. Probably the simplest of these is one in which figures are arranged on both sides of a spiral line, beginning at zero, designating midnight, and running to 23, one hour before midnight. The ends of the line are above and below the figure 12, which indicates noon. In another, the figures are arranged in two circular fields, one black and the other white, the latter surrounding the former. Figures in the black field designate hours of darkness, while those in the white field number the hours of lightness. Roman numerals are used for the hours between midnight and noon, and Arabic numerals for the remaining 12 hours.

¶An aerial mail service between the United States and the West Indies has been promised by the second assistant postmaster-general. He recently sailed for Havana to make arrangements.

THIRTY-SIX FRUIT VARIETIES FROM ONE OLD APPLE TREE

An old back-yard apple tree in an Ohio city is yielding, in rotation, crops of apples of the extra-early, early, medium-early, fall, and winter varieties, besides seven kinds of pears—a total of 36 varieties of fruit. The tree, more than 75 years old, was thought to be dead and in an advanced stage of decay, when the horticulturist responsible for its metamorphosis began his experiments. Skillful and studied grafting, of course, accomplished the seeming miracle. The renewed tree is now vigorous enough to produce some 40 to 50 bu. of fruit every year, all of the choicest kind. Its owner declares that yielding several varieties of fruit at different seasons makes a healthier tree than the usual production of a heavy crop all in one season.

CHICAGO PARK ANNEX BUILT OUT IN LAKE MICHIGAN

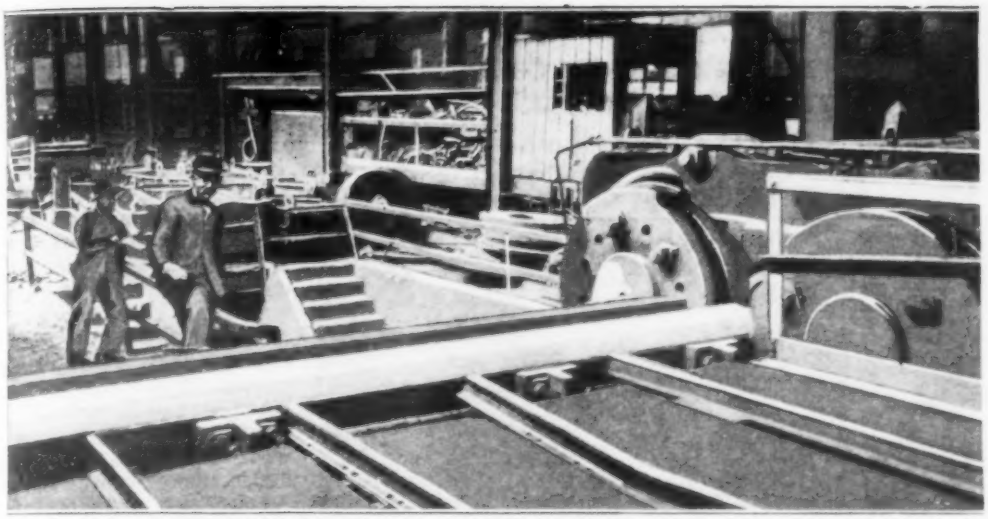
Lincoln Park, one of Chicago's largest playgrounds, has been made still larger without decreasing the land holdings of any neighboring property owner. The addition, just opened to the public, consists of an island, wholly of made land, about 600 ft. out from the Lake Michigan shore, with which a single bridge connects it. The artificial island is about half a mile long, and contains 25 acres. Work on it was started in 1910, but the cover of trees and grass already established gives it a much older appearance. The outer shore line is distinguished by a concrete-paved bathing beach.

ILLUMINATED FOUNTAIN PEN CARRIES OWN BATTERY

In the tube of a fountain pen not extraordinarily large, a New York inventor finds room for the necessary ink well, a tiny incandescent lamp, and a miniature electric dry battery. The light shines out under the point of the pen, its source re-

Electric-Lighted Fountain Pen, Disassembled: The Pen Section, Lamp, Ink Well, and Battery Section are Seen in Order

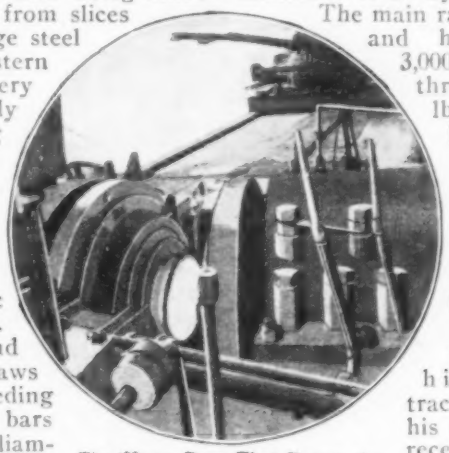
maining invisible to the user's eyes, while it illuminates the spot of paper over which the pen is traveling.



The Ponderous Machine Which Cuts Slices from the End of a Huge Steel Bar, and Makes Them into Wheels: The Bar to be Worked Stretches across the Picture to the Great Cutting Wheels at the Right

HUGE MACHINES FORM WHEELS DIRECT FROM BARS

Wheels and disks are now being made by the rolling process from slices cut off the ends of huge steel bars, in a large eastern steel mill. The machinery used is exceptionally massive. The cutting machine weighs 850,000 lb., and is 36 ft. long, 18 ft. wide, and 13 ft. 6 in. high, with a feed table 60 ft. long. Heavy, eccentric cutter disks on 24-in. shafts slice off the end of the bar, the jaws approaching and receding as they revolve. Round bars from 11 to 20 in. in diameter are cut in eight seconds. The rolling dies are mounted on the facing ends of shafts placed at a slight angle, and the blank is inserted and pressed between them. The rolling machine weighs 800,000 lb., and measures 40 ft. by 18 ft., by 14 ft. high. The main ram is 38 in. in diameter, and hydraulic pressure at 3,000 lb. gives it a total thrust of about 3,000,000 lb., the roller thrust bearing being 44 ft. 8½ in. in diameter. The operation of rolling the disks, taking from 20 to 60 seconds, requires 1,000 to 2,000 hp. from the driving motor.



The Huge Ram That Forms the Disks, Mounted between the Ends of Shafts That Come Together at a Slight Angle: This View Gives a Good Idea of the Machine's Massive Construction

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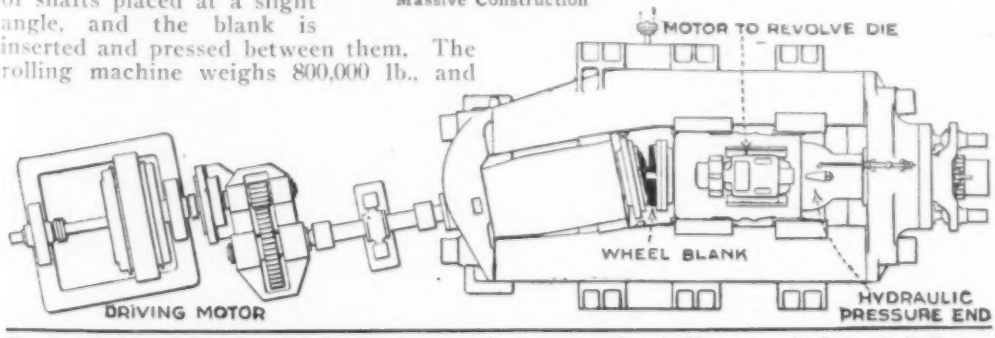
¶An Ohioan believes himself the first contractor to have inspected his work from the air. He recently flew above a long stretch of brick roadway which was nearing completion.



The Ram and the Wheel-Forming Die are Operated by Separate Electric Motors, as the Diagram Indicates. The Wheel Blank is Placed Where the Two Great Surfaces Meet, and is Quickly Rolled to the Desired Shape

BIG WOOD INCLINE FOR AUTOS TEMPORARY BOULEVARD LINK

When the work of completing the connection of north and south-side boulevards in Chicago was held up by conditions of labor and material, the impatient engineers decided to expedite matters and relieve traffic congestion in a novel way. North-bound autoists early this fall found a surprise awaiting them in the shape of a huge incline of wood, bridging the unfinished section and offering a new way out of the business district. The incline is 200 ft. long, 20 ft. wide between rails, and rises 13 ft., making an easy 6½-per-cent grade. The big structure was completed in an actual working period of 48 hours, and gave immediate relief to the traffic situation.

Looking North along Chicago's New Boulevard Link, Now in Process of Construction: The Huge Wooden Incline, Installed for the Temporary Convenience of Autoists, is Seen in the Middle Distance

GLUING VENEER MOIST GIVES BETTER RESULTS THAN DRY

That veneer for paneling and plywood may be glued without the usual process of removing its moisture, and even better results obtained than with preliminary drying, is the discovery of the U. S. Forest Products Laboratory. Casein or other water-resisting glue is used. It is also found that the season for cutting timber, contrary to established notions, has practically no effect on its value or durability. The only important factor is the care of the wood after cutting.

ITALIAN WARSHIP RETRIEVED FROM SEA BOTTOM

Keel uppermost, her thirteen 12-in. guns imbedded in the sea bottom, the Italian superdreadnaught "Leonardo da Vinci" for months resisted all attempts at salvage. It will be recalled that the great ship was sunk at its anchorage by order of its own commander when the explosion of a clockwork bomb threatened the powder magazine, and with it the safety of a dozen near-by warships. As it filled with water, the great steel hull turned over and settled on the bottom. Because of its position, salvage at first seemed impossible. Yet in the face of enormous difficulties divers at last reached and rescued the heavy cannon. Thus lightened, the hull was tightly sealed while powerful pumps injected compressed air. This treatment brought the hull to the surface, the keel still uppermost. Recently, herculean efforts have restored the pride of the Italian navy to normal position, however.

OLD SILO IN RAILROAD YARD HOUSES LITTLE STORE

Like a stranger in a strange land, a weather-beaten silo stands alone in a western railroad yard. But even odder than its being there at all is its present use as a store. Situated among the many tracks, but on a street used daily by 16,000 packing-house employes, it has become an "all around" store where every sort of trinket, candy, or magazine can be purchased. Its legless proprietor believes that no other store in the world is housed in a similar structure.

PIGEON HUNTERS OF PYRENEES USE ODD METHODS

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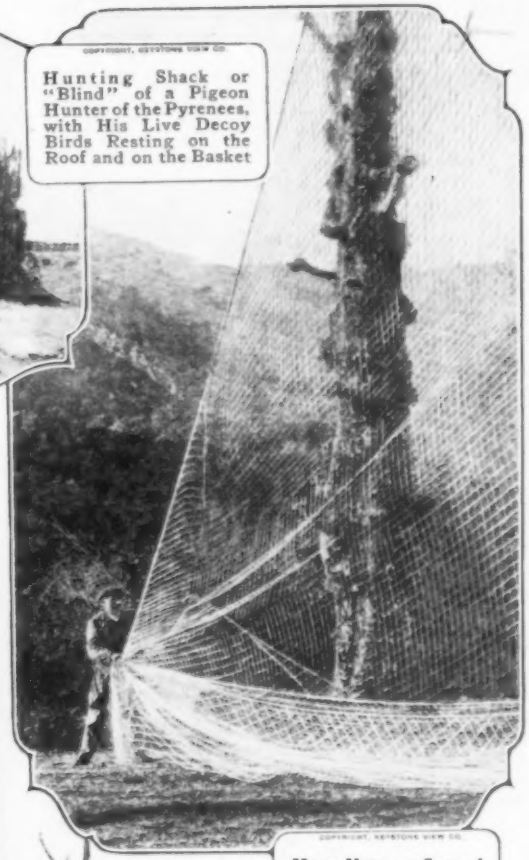
Hunting Shack or "Blind" of a Pigeon Hunter of the Pyrenees, with His Live Decoy Birds Resting on the Roof and on the Basket



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Huge Nets are Spread from the Ground to the Tops of Dead Trees, and the Birds are Driven into Them. Once Entangled in the Meshes, There Is No Escape for Them

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The Live Tame Birds Used as Decoys are Taken into the Forest by the Hunters, Where Their Presence and Seeming Unconcern Invites Their Wild Cousins in Great Numbers to the Nets or the Guns, as the Method of the Day may Be

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Each Hunter Carries a Supply of Disks, and When the Nets are Spread, He Sails the Round Missiles into the Flocks Until the Frightened Pigeons Fly Straight into Captivity

USE HOUSE-MOVING METHODS TO TRANSPLANT BIG TREE

Transplanting a full-grown tree was accomplished near Detroit recently by applying house-moving methods to the task.

Big Tree Moved by Incasing Its Roots, Jacking Up the Platform Underneath, and Working It to Its Destination on House Movers' Rollers

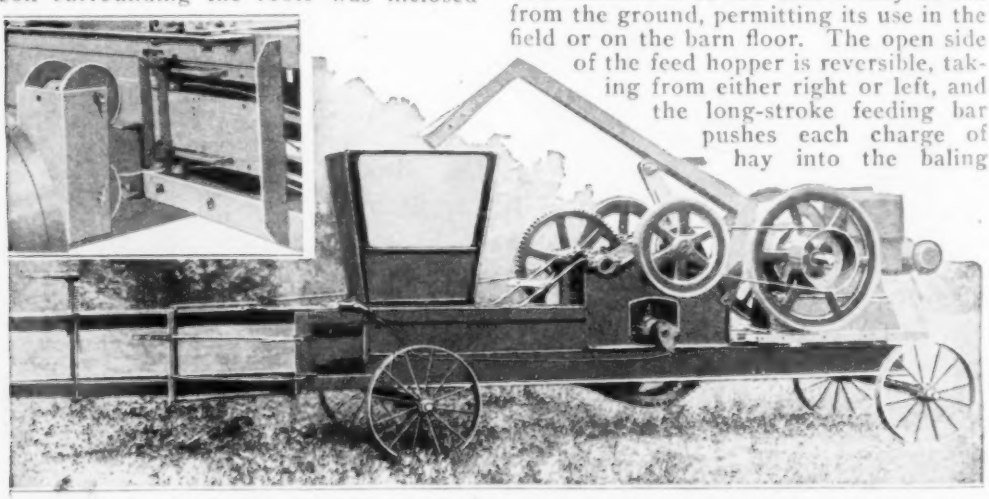
A circular trench, about 25 ft. in diameter and several feet deep, was dug around the tree with the trunk as its center, and the soil surrounding the roots was inclosed by vertical staves, bound with cables. Under the earth thus held together a platform of heavy timbers was placed. The tree and its root soil were then elevated with jacks, allowing rollers to be inserted between the platform and wooden tracks which were laid on the ground. An ordinary horse-actuated capstan was employed to pull the tree, a large ditch being excavated for the passage of the load, which weighed approximately 125 tons. Over two weeks were required to move the tree 141 ft. from its original location.

LOGS SHOOTING LONG CHUTE SET AFIRE BY FRICTION

The curious spectacle of great logs set afire by the friction of their rapid descent in a long chute was witnessed recently in the mountains of Washington State. Logs of exceptional length were needed for special water-front piling, and could be found only at a great height. The chute down which the cut timbers were slid was over a mile long, and the big sticks attained a tremendous velocity. One that "jumped the track" on the way, shattered a 24-in. oak tree in its course, without material damage to itself.

SELF-THREADING HAY PRESS HAS MANY IMPROVEMENTS

A hay-baling machine recently brought out by a Kansas concern has a number of new features that reduce the amount of labor usually required for the operation. The machine is so low that it may be fed from the ground, permitting its use in the field or on the barn floor. The open side of the feed hopper is reversible, taking from either right or left, and the long-stroke feeding bar pushes each charge of hay into the baling

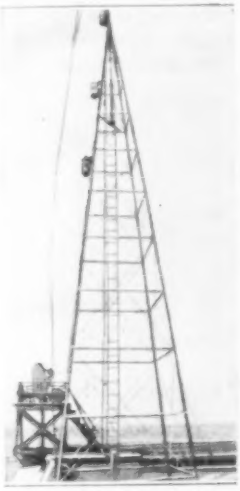


General View of Self-Threading Hay Press, in Which the Long-Stroke Feed Bar and Open-Side Hopper may be Noted: The Insert in the Corner Gives a Detail View of the Wire-Threading Mechanism for Binding the Bales

chamber without manual assistance. A novel attachment is the self-threading needle bar, which, when the operator thrusts it through the machine, catches and returns the baling wire ready for tying, and this operation is quickly completed. Two different sizes are run by six and eight-horsepower gasoline engines.

LOFTY STEEL SIGNAL TOWER WILL WARN OF STORMS

Ships far out at sea will be warned of approaching storms night and day by signals displayed on a lofty steel tower recently erected by the Weather Bureau at San Pedro, on the California coast. The structure is 75 ft. high and is located on the roof of a seven-story building, making the elevation of the top of the tower over 150 ft. above the level of the water. Regulation flag signals will be employed in the daytime to indicate weather probabilities, and at night red and white electric lanterns will be hoisted. The direction of the wind will be told by the arrangement of the lanterns or flags. An electric searchlight is mounted at the base of the tower. It will also serve as a beacon to guide vessels into the harbor near which the structure is situated.



STREET-SPRINKLER WAGONS HAUL WATER TO HORSES

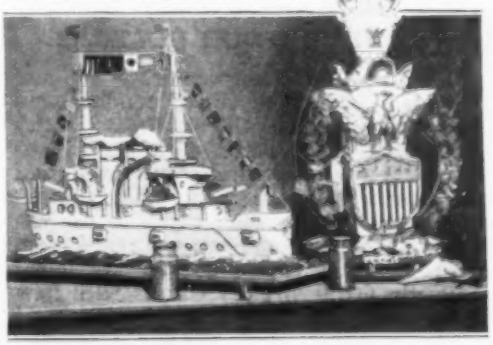
When state authorities decided recently that water troughs were inimical to the health of horses, and decreed their abolition in New York City, an organization interested in the welfare of animals adopted a novel means of supplying the beasts with drink. Discarded street-sprinkler wagons were put into service by removing the spraying device at the rear and installing in its stead a pipe equipped with a number of faucets. The tanks, which hold 600 gal., are filled at street hydrants, and driven to steamship docks and railroad depots, where horses are compelled to stand while the trucks they draw are loaded or unloaded. Pails

A Traveling Water Trough: This Is One of Several Converted Street-Sprinkler Wagons Used in an Eastern City for Quenching the Thirst of Horses

carried on the wagons are filled from the faucets by drivers, and taken to the thirsty animals.

SAN FRANCISCO CHEF MOLDS EXTRAORDINARY CAKES

Sculptors may find cause for envying the San Francisco chef who molded two elaborate cakes which were served at a dinner given by that city in honor of Secretary of the Navy Daniels during a recent visit of the cabinet member. One of these was in the form of a battleship. From the funnels of the miniature war vessel smoke appeared to be issuing, while it rested on a billowy sea of icing. A national shield, made of dough and surmounted by a vase of flowers, was presented to the wife of the secretary by the ingenious pastry architect.



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Cakes Served at a Banquet in Honor of Secretary of the Navy Daniels: A Barrel of Sugar was Required for the Miniature Battleship

HUGE RELIEF MAP OF TEXAS SHOWS ALL RESOURCES

A framed relief map of the state of Texas, measuring 15 by 18 ft., and weighing about 2,000 lb., has been prepared to show in detail all the natural resources of the commonwealth. Reinforced papier-mâché is the material used, the contours being worked out with great care. It is mounted on a white-pine back, with supports of steel, and cost some $3,000, taking two months to build. The 265,000-square-mile area of the state is reproduced to a scale of approximately ¼ in. to the mile. Lettered in are the names of towns and districts, and the commodities produced by each locality, both agricultural and mineral. The big map will be exhibited in all parts of the country.

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Relief Map of the State of Texas, About 15 by 18 Feet, Giving It a Scale of a Quarter Inch to the Mile: The Contours are Worked Out in Reinforced Papier-Mâché, Mounted on White Pine, and All the Natural Resources are Indicated

CITY MECHANICS MAKE AUTOS FOR SIXTY-FOUR DOLLARS

Using parts taken from worn-out and discarded autos, the superintendent and five mechanics of the Cincinnati city garage have completed two new machines at a total cost for purchased material of $64 each. Even the labor was a spare-time item, the workmen enjoying the exercise of their ingenuity as a relief from the routine of caring for 73 municipal cars. By fitting broken wheels with new spokes, hammering bent windshield frames straight, and similar salvaging operations, the call for new material was reduced. The cars show so far a running cost of only 2.2 cents a mile.

COMPANY WRITES MANY FORMS OF AERIAL INSURANCE

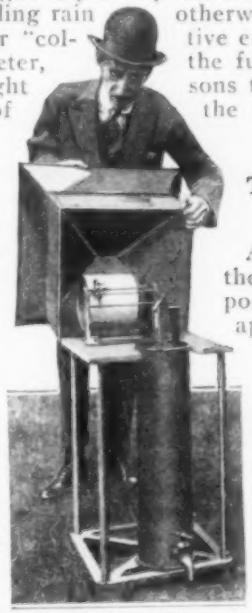
The surest proof that the airplane, as a commercial vehicle, has come to stay is found in the growing disposition of the great insurance companies to cover almost every imaginable risk. Already in this country, although America is behind England in the matter, several fire-insurance companies are writing policies which cover planes from fire risk both in the hangar and in the air. And one progressive American company which specializes in life, liability, and accident insurance is now courageously broadening all of these departments to include aerial risks. Its greatest business is being done at present in protecting the airplane owner against public liability, and damage inflicted by his plane on property or persons. In addition, the company writes compensation insurance for employers of pilots, and is even willing to insure an airman's life for a special premium and a term of one year. But of most interest to the general public is the trip insurance which closely resembles the railroad insurance familiar to every traveler. Like this latter, the aerial-trip ticket carries accident insurance for a definite amount for every possible injury. On the whole this new business of aerial insurance is now on somewhat of a sporting basis, owing to the lack of data, but even so it is proving an invaluable stimulant to commercial aviation.

RAIN GAUGE WRITES OWN WEEKLY RECORD

The constant personal attention necessary with the rain gauge formerly used by the U. S. Weather Bureau has resulted in the development of a mechanical instrument which automatically records the time and amount of all precipitation during a period of eight days.

As with the previous type, falling rain is caught in a brass funnel, or "collector," 8 in. in maximum diameter, from which it runs into an upright cylindrical tank. But instead of measuring the water in this tank with a graduated stick, as with the old gauge, the weather man now allows the instrument to keep its own record by means of a float which actuates a pen point against a revolving cylinder.

In more detail, an unstretchable brass chain is led upward from the float and around a small horizontal drum. A counterweight hangs from the other side of the drum, so that the drum shaft turns with every vertical movement of the float. A sliding cam on the shaft transforms this rotation into a back-and-forth motion of the pen point. The latter leaves its trace upon the record cylinder which is turned by internal clockwork through one revolution each day. As the cylinder revolves, the worm shaft which bears the pen point carries it from left to right in eight days. So at the end of this period the weather man learns from the meanderings of a single line every variation of the water level in the cylindrical tank.



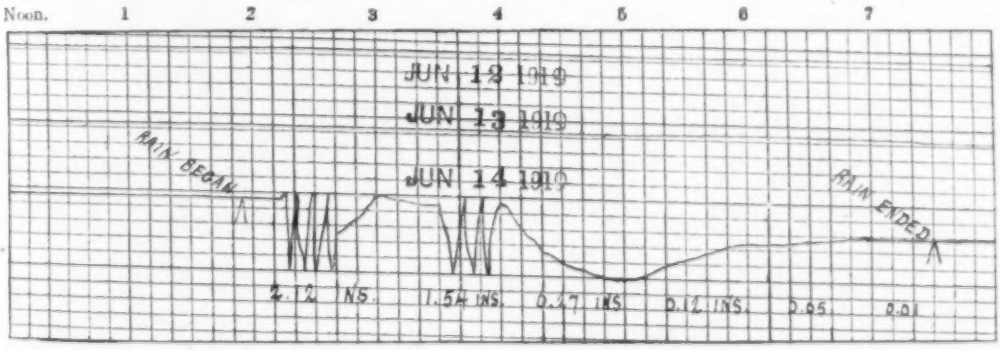
The Weather Man has Tilted Back the Copper Cover to Show the Cylinder on Which is Written the Weekly Record

It will be seen from the illustration that the four sides of the copper cover are extended to form a flaring shield for the funnel mouth. This is done to break up the eddying air currents which would otherwise cause a considerable negative error by blowing raindrops from the funnel mouth. For obvious reasons the gauge cannot be used when the temperature is below freezing.

CROSSING RIGHTS TO AUTOS APPROACHING FROM RIGHT

At city street crossings where the traffic is not sufficient for the posting of an officer, automobiles approaching each other at right angles frequently encounter a right-of-way problem that may end in an accident. An east-coast city has simplified the question by giving the privilege of first passage to the car coming from the right. In case of collision, the police take the positions of the two cars as evidence, the one coming from the left being regarded as in the wrong. Police officers in the same city regularly visit the schoolrooms and instruct the children in the precautions which rob a street crossing of its dangers.

¶ Of the Mexican oil lands, computed to exceed in total area the whole of France, only 1⅓ per cent is under development.



Only Eight of the Twenty-Four Hours are Shown on This Fragment of a Weekly-Record Card. Inspection of the Lower Line, However, will Give an Understanding of the Method Used. Each Vertical Division Represents .05 Inch; and Each Horizontal Division 10 Minutes of Time. So It is Seen That an Inch and a Half of Rain Fell between 3:00 and 4:00 on the Afternoon of June 14, 1919

MOTORCYCLE TAKES TO WATER UPSIDE DOWN IN SPILL

The dangers of high-speed motorcycling on a wet beach were illustrated in

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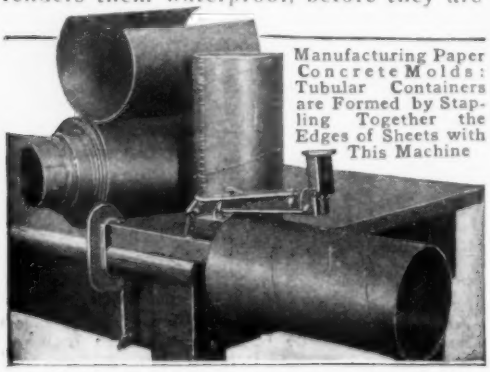
Motorcycle Accident Caused by Riding at High Speed on a Wet Beach: Machine, Sidecar and All, Took to the Water Upside Down

spectacular fashion during the recent annual races of a New Jersey club. In the sidecar event, one of the machines struck a hole in the sand, concealed by a pool of water, and the whole vehicle went into the ocean upside down. The rider, by a happy chance, emerged from the adventure practically uninjured.

CONCRETE TEST CYLINDERS MADE IN PAPER MOLDS

Paper is employed by the Bureau of Standards for making molds in which are cast the concrete cylinders used in tests. Sheets of the material are converted into tubular containers by fastening their edges together with staples, a hand-operated machine performing this task. The molds are dipped in hot paraffin, which renders them waterproof, before they are filled with concrete. Each mold weighs only 7 oz., considerably less than those made of steel, which they have supplanted. The sheets can be nested together for shipment.



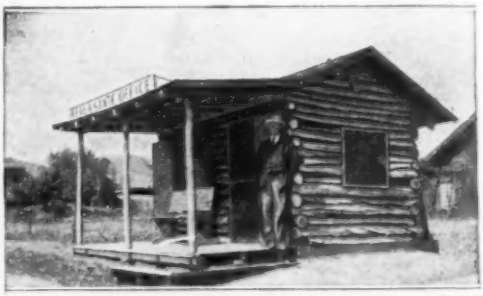
Manufacturing Paper Concrete Molds: Tubular Containers are Formed by Stapling Together the Edges of Sheets with This Machine

NAVY PLANS SEAPLANE TOURS TO BRAZIL AND PHILIPPINES

Working with the information gained from the first transatlantic flight, experts of the Navy Department are now designing a new type of seaplane for fresh adventures next spring. One flight is to be made to Brazil, by way of Hampton Roads, Va., Cuba, Haiti, Santo Domingo, Trinidad, to Rio de Janeiro. More spectacular, however, will be an air journey of 7,000 miles from San Diego, Calif., by way of Hawaii and Guam, to the Philippine Islands, and possibly to Hongkong. The first leg of this last tremendous flight is 2,000 miles long.

LOG CABIN USED AS OFFICE BY REAL-ESTATE AGENT

Prospective real-estate purchasers have little difficulty in finding the office of a certain California dealer in residence lots,



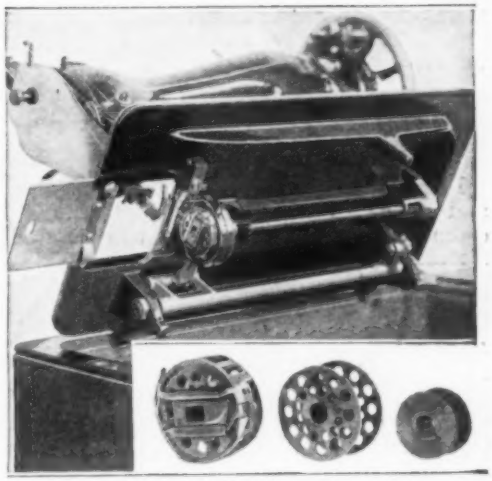
Something Out of the Ordinary in the Way of Real-Estate Offices Is This Log Cabin, Which is Used by a West-Coast Lot Salesman

though his place of business is located on a tract dotted with buildings occupied by salesmen handling the same line. The explanation lies in the office itself, which is nothing more nor less than a log cabin. Because of its unusual appearance on such a site, the structure serves as an advertisement for its owner, and a landmark for persons in search of him.

¶ A production of beet sugar this year estimated at 1,750,000,000 lb., coupled with a curtailment of the European crop, places the United States second among the world's producers of that commodity. The cane-sugar crop will not exceed 20 per cent of the total.

IMPROVED SEWING MACHINES CUT FACTORY TIME LOSS

It is calculated that the time lost by operators of power sewing machines in factories while changing bobbins will be reduced 80 per cent by a new type of machine. The feature of the device, an Indiana invention, is a very large bobbin, designed to hold enough thread for an hour and 40 minutes of work, instead of the usual 20 minutes. A further reduction of waste time is accomplished by an automatic system of lubrication, doing away with the customary five-minute periods allowed twice daily for oiling, a total saving of some consequence.

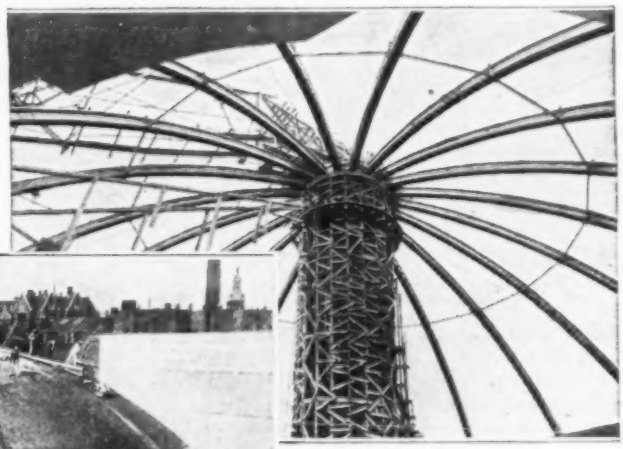


Sewing Machine with Extra-Large Bobbin, Saving Operator's Time in Changing: Bobbins are Seen at Bottom in Detail

¶ By underquoting the Japanese more than $9 to the ton, Australian coal exporters are bidding strongly for the Philippine market.

HUGE CONCRETE DOME CROWNS DANISH THEATER

Limits set on the use of concrete only a brief time ago are being put in the discard with surprising rapidity, so swift has been the progress made in adapting the material to purposes theoretically impractical or impossible in the recent past. A few years back the employment of concrete for domes was opposed by engineers, but a large theater recently completed in Copenhagen, Denmark, shows such construction to be desirable. The playhouse is crowned with a dome 130 ft. in diameter, made of concrete molded with considerably less scaffolding than would have been necessary with brick or stone. Twenty radial steel ribs, braced by three circular beams, form the foundation of the arched roof, which is strongly reinforced and coated with asphalt. Material was hoisted by a crane mounted on top of a lumber



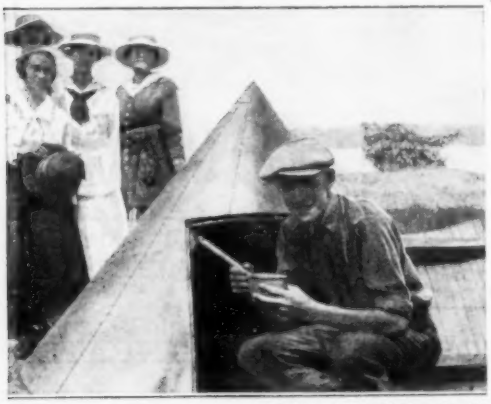
Here can be Seen the Curved Steel Radial Ribs, Supported by the Lofty Tower of Lumber, on Which is Mounted the Crane for Hoisting the Materials

View of the Concrete Dome in a Partly Completed State: The Reinforcing Material Is Visible in the Section against Which the Ladders are Leaning

tower built in the exact center of the dome. Practically no other scaffolding was necessary.

WELL COVERINGS IN KANSAS LOOK LIKE TENTS

In western Kansas the winds are strong, and above the farmers' fields the air is often filled with dust and insects and



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Cone-Shaped Coverings Used to Keep Dirt and Insects Out of Open Wells in the Farm Fields of Western Kansas

flying débris. To protect the open wells, queer cone-shaped coverings are used, each with a door in the side through which the water can be reached without admitting any extraneous matter.

AUTOMOBILE PARTS CLEANED WITH JET OF STEAM

Gasoline is an expensive material, but in spite of this it is used in most garages for removing oil and dirt from automobile parts. A more economical method of performing this operation is employed by a repair man in a western city. Parts are placed on a concrete bench, and a jet of steam is applied to them by means of a flexible steel hose. Only a few minutes are required to clean each piece, and little labor is necessary, as one man can guide the hose and manipulate the conveniently located valve which controls the flow of steam. Condensed vapor, oil, and dirt are carried away by a drain in the bench.

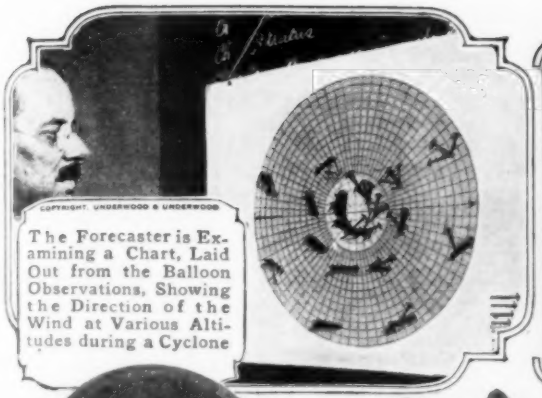
Cleaning Motor-Car Parts with Steam: To the Right of the Workman can be Seen the Valve Which Controls the Flow of Vapor

AIRPLANE WITH SUPERCHARGER SETS TWO-MAN ALTITUDE MARK

The airplane-engine supercharger has scored again. In the October number of Popular Mechanics Magazine was illustrated and described this remarkable constant-power mechanism which enabled Major Schroeder to fly as fast at 18,400 ft. as at ground level. Using again a Le Pere-Liberty biplane equipped with a Moss supercharger, the major has now established a world's altitude record for machines carrying a pilot and passenger. The height attained was 29,000 ft., which is greater by 750 ft. than his own record set on September 6.

FORECASTING AIR CONDITIONS NEW SERVICE FOR FLIERS

Weather conditions of the upper air and their relation to the safety of flight are now made the subject of special forecasts by the U. S. Weather Bureau, and reports are issued twice a day. Wind velocities naturally are the most important factor, and for their observation small spherical balloons are used. These thin gas bags are inflated to about 26-in. diameter, carefully measured with big wooden calipers, and their "free lifting" power weighed in a sensitive scale. They are then released from some high point and the time recorded. Once a minute the course of each floating sphere is observed through an American-made theodolite, of a form developed especially for this work. From this record a chart is readily prepared which maps exactly the wind direction and velocity at different heights. The reports translate these findings into simple language of few words, sample forecasts reading merely, "Good flying weather," or perhaps instead, "Bad flying weather; showers and thunderstorms, and fresh and strong northwest winds aloft." The reports are telephoned morning and night to the various flight directors.



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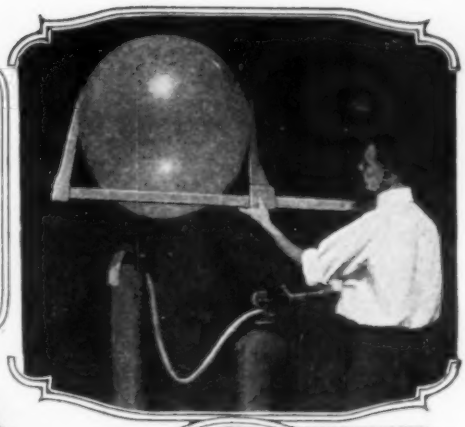
The Forecaster is Examining a Chart, Laid Out from the Balloon Observations, Showing the Direction of the Wind at Various Altitudes during a Cyclone



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Observer Weighing the "Free Lift" of an Inflated Balloon on a Pair of Sensitive Scales, So That the Correct Computation can be Made When the Little Gas Bag is Sent Aloft to Try the Air

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Measuring, with Wooden Calipers, the Diameter of a Balloon being Inflated, Preparatory to Its Release for Indicating the Direction and Velocity of Air Currents

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Observer Releases the Balloon at a Given Instant, Timing It Carefully; the Other is Preparing to Take Notes on the Direction and Speed of Its Changing Course

U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU

SPECIAL FORECASTS FOR OFFICE OF DIRECTOR, MILITARY AERONAUTICS.

(To be telephoned at 9.30 a. m. and 8.30 p. m.) Telephone No. 2170, Branch 21

Phoned 9:40 a.m. *Washington, D. C.,* August 21, *1919.*

Forecast for following 24 hours for—

Zone No. 1 (North Atlantic States): Good flying weather.

Zone No. 2 (Middle Atlantic States): Good flying weather, except for considerable cloudiness.

Zone No. 3 (South Atlantic States): Good flying weather.

Zone No. 4 (Lakes Region): Bad flying weather; showers and thunderstorms and fresh and strong west and northwest winds aloft.

Zone No. 5 (Ohio Valley and Tennessee): Bad flying weather, showers and

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Part of a Typical Report Sheet, Made Up from the Chartings of Balloon Flight and Translated into Simple Language: It is Telephoned to Flight Directors Morning and Night

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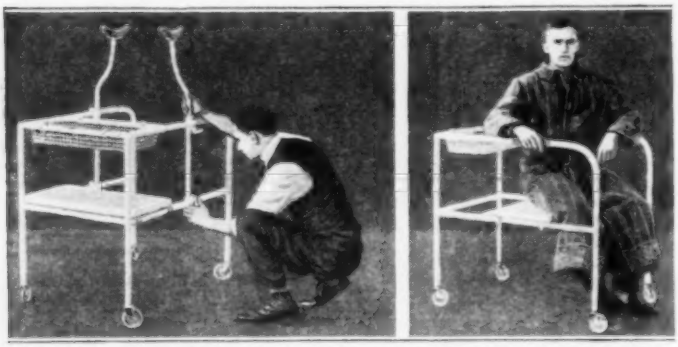
The Theodolite, an American-Made Instrument Designed for This Purpose, is Used by the Observer to Determine the Angle, and Thereby the Speed and Direction, of the Drifting Bag

SICK-ROOM WALKING CHAIR STRENGTHENS SHAKY LEGS

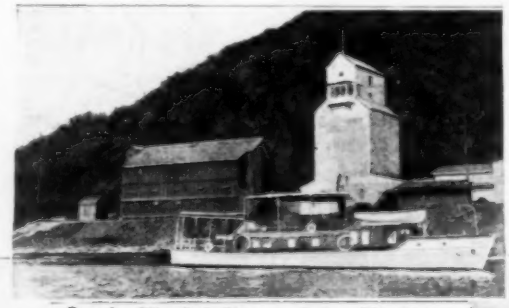
Hospital attendants frequently find that a patient requires quite as much attention when convalescing as when desperately ill. He must have that magazine, or wants that light turned on. Later he must be helped into and out of his wheel chair; finally he demands the help of an orderly in learning to balance himself on his legs once more. But many hospitals now escape these difficulties by providing the convalescent with a new "walking chair," which not only enables a patient to do for himself, but requires him to use and thus rebuild his muscles. Made of light steel tubing and rolling on ball-bearing casters, the chair is easily pushed along the floor. When the patient wishes to sit down he finds it easy to pull a sliding cane seat into place. Adjustable crutches may be fitted to the chair during the earlier stages of convalescence. The patient is thus placed on his feet days before he could use ordinary crutches.



This Walking Chair Quickens Convalescence by Encouraging the Patient to Wait upon Himself. In the Earlier Stages Crutches are Fitted to the Framework, as at the Left. The Sliding Chair is Pulled Forward, as at the Right, When the Patient Grows Tired

GRAIN-ELEVATOR TOWER IS SCENIC OBSERVATORY

Like his father before him, an Iowa grain dealer has worked his way to success and happiness in a village on the banks of the Mississippi. Love of the wooded hills and broad river being thus his heritage, he was oddly inspired during the construction of his newest grain elevator. Into the cupola, a hundred feet or more above the water's edge, he ordered the construction of a spacious room and broad bow window, with the result that visitors to the elevator are now lifted in the "hoist" from the dust-whitened rooms below to a sunlit observation parlor at the top. Here they find rugs, a table, and comfortable chairs. Stepping to the windows they look down upon the Father of Waters as he twists among the hills, past tree-clad islets. To the south they see the proposed Mississippi Valley National Park, full of historical and scientific interest.



On the Wooded Shores of the Mississippi Stands the Grain Elevator, with the Windows of the Observation Tower Seen Clearly at the Top

Looking North and South from the Broad Bow Windows of His Observation Room, the Grain Dealer is Rewarded by These Views of the Mississippi. The River at This Point Is About Three-Quarters of a Mile Wide; Its Course is Broken by Tiny Tree-Clad Islets and Confined by Wooded Banks That Rise as Graceful Hills

PREHISTORIC ESKIMO VILLAGE UNEARTHED BY SCIENTISTS

A whole village of Eskimos of a prehistoric tribe, buried in the everlasting ice of latitude 75°, has been discovered by a scientist who, for almost two years, has been excavating in the vicinity of Barrow Point, on the north shore of Alaska. The bodies of 80 inhabitants of the ancient settlement were unearthed, and several have been sent to the museum of an eastern university. That the period of their life corresponded with the "stone age" is demonstrated by the shape of their heads.

PLANES FLY IN FORMATION UNDER NEW YORK BRIDGES

Like small boys at a game of "follow the leader," three airplanes recently flew together under the five bridges which span the East River in New York City. They circled high above the first bridge in triangle formation, then glided smoothly beneath. Emerging on the other side, they "zoomed" for altitude, then glided beneath the next. This graceful maneuver was repeated for each of the five bridges.

CONCRETE WATER TANK BUILT IN ATTRACTIVE TOWER

A concrete water tank recently completed at the Balboa, C. Z., railroad yards, bears no resemblance to the structures of wood or steel ordinarily used for this purpose. Externally the container is a square tower, nearly 44 ft. high, surmounted by a castellated parapet, which relieves the otherwise plain appearance of the structure and artfully conceals its nature. The tank inside is 22 ft. in diameter and 19½ ft. high, and is supported about 40 ft. above the level of the tracks by the walls. Its capacity is 59,500 gal. Valves for controlling the flow of water into and from the tank are housed in the lower portion of the tower. Twenty-four tubular piles, filled with concrete, serve as a foundation for the building, which was erected on reclaimed swamp land. Some of these supports are 50 ft. long.

TINY MOTOR ON DENTAL TOOL WEIGHS BUT FOUR OUNCES

What is claimed to be the smallest practical power motor in the world, and looks the part, forms the electrical portion of a new dental-tool holder. The motor weighs only four ounces, and is but 1¼ in. in diameter and 2½ in. long. With its gearless, vibrationless shaft extension for holding the drills and buffer, the over-all length is 7 in. The complete tool is held like a fountain pen, a foot-operated controller regulating the speed from 600 to 3,000 revolutions a minute. It may be plugged into any lamp socket.

BUILDING-CAMPAIGN DINNER ANNOUNCED BY BRICKS

Pasted on bricks, ordinary bricks, were the several hundred invitations recently issued for a large dinner meeting of workers in a building-fund campaign. Neatly wrapped, addressed, and stamped, the strange messages made a heavy load for the truck which bore them from campaign headquarters to the New York City post office. Here they were declared to be the queerest invitations ever sent through the mail.

Wrapped, Addressed, and Stamped Like Ordinary Letters, the Hundreds of Bricks Shown Above were Recently Mailed as Invitations to a Meeting of Workers in a Building-Fund Campaign. One of the Odd Missives is Shown at the Left

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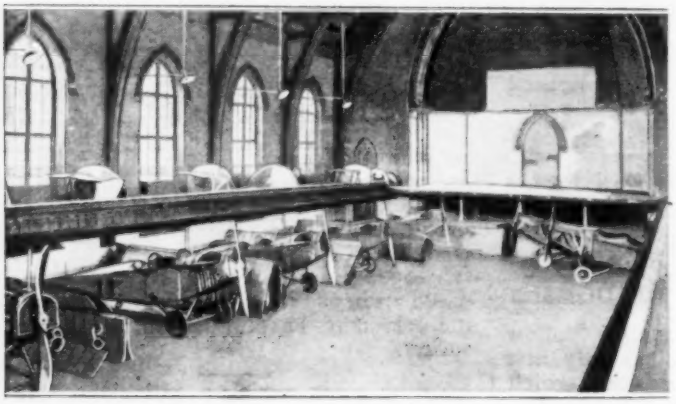
CHURCH AUDITORIUM IS IDEAL AIRPLANE-DISPLAY ROOM

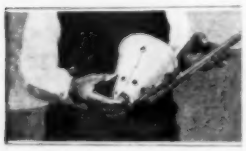
The ample floor space, large windows, and many hanging lights of an old Chicago church building are responsible for its present use as an airplane-display room. Before securing the church building, the dealer found it difficult to maintain adequate stock in his down-town location, but the generous accommodations of his present salesroom enable him to keep on hand a sufficient reserve of planes. He handles biplanes formerly used by the Canadian government for training purposes, and so far has found their sale an easy matter.



An Automobile Dealer Who Sells Airplanes as a Side Line Considers This Auditorium of an Old Church Building an Ideal Display Room. Floor Space Is Ample. Wide Windows and Electric Lights Provide Illumination

WALNUT-HARVESTING DEVICE SIMPLE IN OPERATION

Gathering walnuts from the ground is made less laborious by an ingenious device recently patented by a Californian. On the end of a stick, about 3½ ft. long, is fastened a flaring container of galvanized sheet iron, in the bottom of which is a hole large enough to admit a walnut. Four wires, running down the outside of the vessel, terminate in loops at this hole and form an elastic ring, which enlarges when pressed down on a nut, and closes after the latter has passed into the container. When the funnel is filled, it is emptied into a larger receptacle.



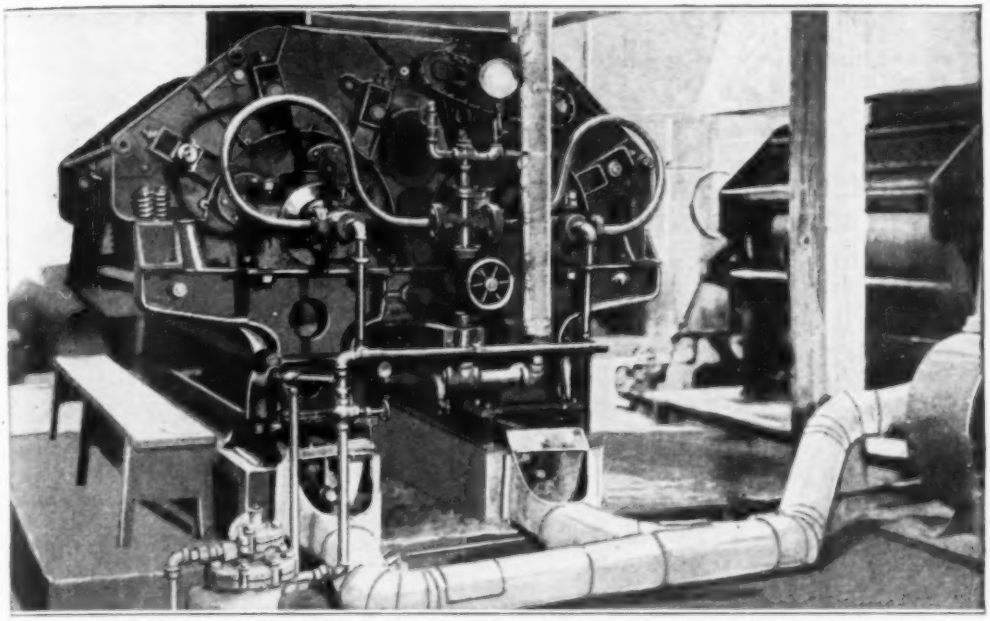
TEST PRESERVING METHODS FOR ROOF TIMBERS

Roof timbers in buildings where high humidity is the rule have been a source of trouble to operators of paper and cotton mills, and other industries, because of their tendency to decay rapidly. In order to determine the best means for preserving such timbers, the Forest Products Laboratory at Madison, Wis., has conducted a series of tests of the various treatments. As a result, it was recently announced that the pressure method, with either creosote or a zinc-chloride solution, will give better results than steeping, dipping, or painting. Twenty years may be added to the life of the wood by this treatment, it is declared, though it is admitted to be the most expensive. Each cubic foot of timber should receive 8 to 12 lb. of creosote, or ½ lb. of zinc chloride, if the latter is used.

WOMAN DONS ARMY GAS MASK WHILE PEELING ONIONS

Peeling onions is an eye-torturing operation, as every housewife knows from painful experience. This disagreeable feature of the task is eliminated by an Ohio woman, the mother of an over-sea veteran, who wears the gas mask her son brought back from France when she pares the over-fragrant bulbs. She has learned to adjust the device to exclude the fumes in a remarkably short space of time, and declares it to be a perfect protection for the eyes.

¶ Waste land at the sides of 4,000 miles of improved roads in New York State will be planted to fruit and nut trees, and alfalfa, if a plan suggested by the highway commissioner is carried out.

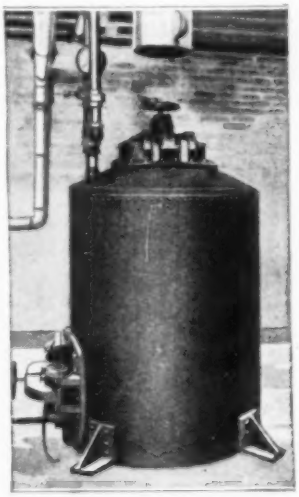


Cooked Potatoes Passing through This Machine are Peeled, Their Skins and Pulp are Separated, and the Latter Emerges in Dried Flakes, Ready to be Ground into Flour. The Picture Shows the Discharge End of the Device

POTATO-FLOUR PRODUCTION BECOMING IMPORTANT

Potato-flour mills, started during the war to supply the demand for a wheat substitute, have become factors in the food-supply problem of the nation, and economic authorities predict a future of growing possibilities for the industry. Before the United States entered the world conflict, there was not one plant in this country for the production of potato flour on a large scale. At the present time there are several of importance in operation, and their output is represented by figures of considerable magnitude.

One of the larger mills is located in an Idaho city. It is notable not only because of the amount of flour produced there, but on account of the character of the raw material utilized. Only imperfect potatoes, which could not be marketed in their natural state, are used. Naturally, the cost of these is less than that of more perfect tubers, and the resultant flour is sold at a lower price than would be possible otherwise. The manufacturing process used in the Idaho mill is extremely simple. After being thoroughly washed, the potatoes are placed in a steam cooker having a capacity of 1,000 lb., where they remain for 25 minutes. Following this, they are sent to the drying machine, which first chops the cooked vegetables into a pulp, then separates the skins from the bulk of the potato, and finally dries the pulp so that it is ready for the last operation, that of milling. Grinders of special construction are used for converting the flaky material which comes from the drier into fine-grained flour. The skins of the potatoes have been found suitable for feeding to cattle or hogs.



Steam Cooker: After 25 Minutes in the Steel Tank, Potatoes Are in Condition to be Placed in the Drying Machine. Only Imperfect Tubers are Utilized

Six other potato-flour mills are located in various parts of the country. One of these, operated in a

southern state, makes sweet-potato flour, utilizing a large crop of that vegetable grown in the district. The output of all of these mills is 40,000 lb. of flour daily. About 5 lb. of potatoes are required to manufacture 1 lb. of flour.

EXTRACTOR FOR FRUIT JUICE IS ELECTRICALLY DRIVEN

The old-fashioned lemon squeezer has gradually developed until now, in a form just introduced, it is run electrically and extracts a whole gallon of orange or lemon juice in five minutes. The new utility is made of noncorrosive white metal, with the motor in the base, and all parts that contact with the fruit are instantly removable for cleaning. In operation, the fruit, cut in half, is simply pressed down upon the rapidly revolving bulb at the top, and the juice promptly issues from a spout at the side. Three sizes of bulbs are supplied. The machine is intended especially for hotels, restaurants, and soda fountains.

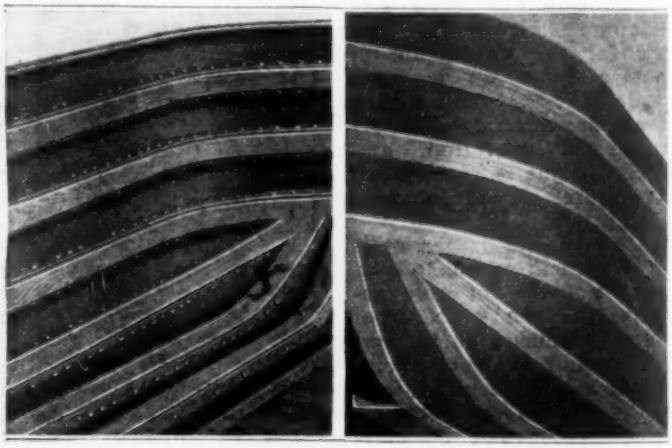
Motor-Driven Fruit-Juice Extractor: The User Presses a Half Orange or Lemon on the Bulb, and the Juice Flows from the Spout. The Machine is Seen Above Disassembled for Cleaning

COSTLY FOUR-MILE HIGHWAY IN NEW YORK STATE

Mileage considered, a road which is to be constructed between West Point and Newburgh, N. Y., will be one of the most costly highways in the country. Though it is but four miles long, it is estimated that an outlay of $700,000 will be necessary for its completion, or, in other words, $175,000 for each mile. The short road will extend around Storm King Mountain, about 300 ft. from the base of that eminence, and will be in the form of a great shelf hewn in solid rock. Traffic between New York City and Albany, N. Y., will use the stretch.

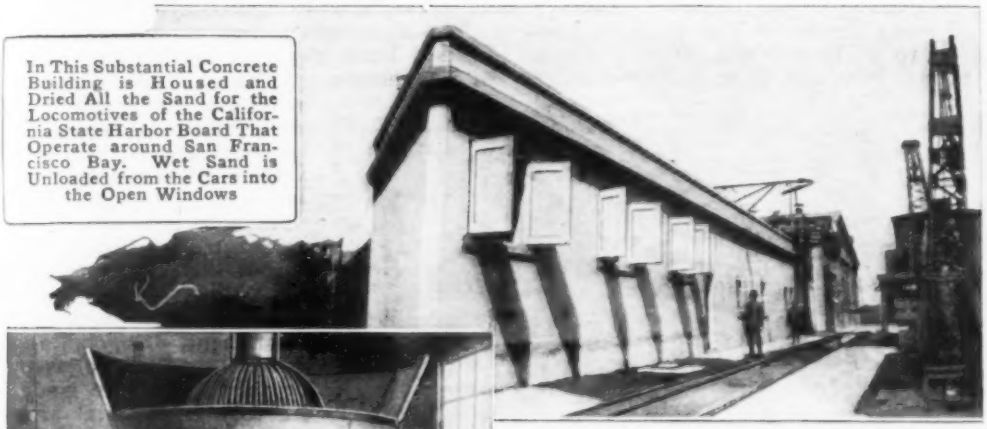
WOOD AND STEEL COMBINED IN NEW-TYPE BOAT HULL

Channel steel is combined with wood in a novel manner in the construction of boat hulls built up or assembled according to a recently patented system, which is declared to produce exceptionally strong and durable bottoms at a relatively low cost. The metal is placed in lengthwise strips, with the flanges turned inward, material 12 in. wide being employed. Pine timbers, 6 in. square, are laid between the channels, and 8-in. bolts, passing through these and the flanges at 6-in. intervals, bind the parts together. Before the bolts are tightened, cotton gaskets, saturated with lead paint, are inserted between the wood and metal as calking. Canal barges and harbor lighters constructed in this way are said to have the advantages of both wood and steel boats, and to possess none of the disadvantages of either, being light, resilient, and resistant.

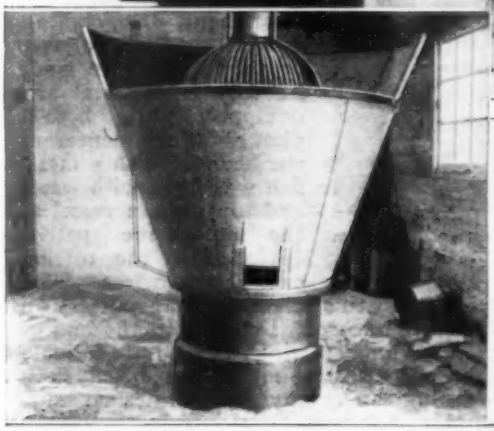


Boat Hull of Channel Steel and Wood: The Illustration on the Left Shows the Interior, and in It can be Seen How the Strips are Fastened Together with Bolts and Calked with Paint-Saturated Cotton Gaskets. At the Right Is an Exterior View

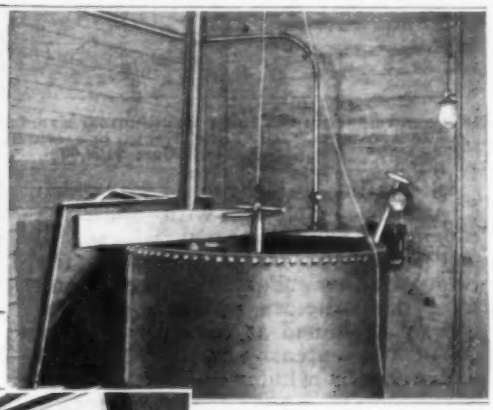
SAND FOR LOCOMOTIVES SUPPLIED LIKE WATER



In This Substantial Concrete Building is Housed and Dried All the Sand for the Locomotives of the California State Harbor Board That Operate around San Francisco Bay. Wet Sand is Unloaded from the Cars into the Open Windows



The Wet Sand is Shoveled into the Top of This Drier, and, When Dried by the Central Heater, It is Run Out through the Apertures at the Bottom



Into This Tank the Dried Sand is Shoveled, and Pressure is Then Applied

Just as He Secures Water from the Overhead Tank, the Fireman Is Here Able to Fill His Box with Sand by Means of Compressed Air

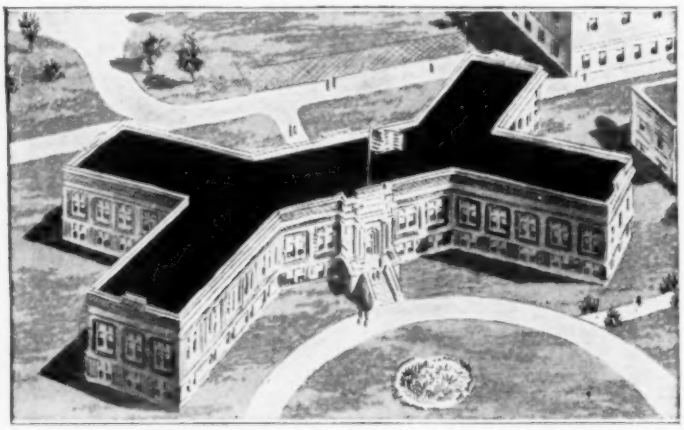
Locomotives owned by the California State Harbor Board and operated about San Francisco Bay are all supplied with sand from a central drying house, specially designed and built for the purpose. Wet sand delivered to the "house" is first shoveled into a steel drier, shaped like an inverted cone, where a central heater removes all moisture and permits the dry sand to escape through openings at the bottom. This sand is then shoveled into a large air-tight tank, where it is placed under heavy air pressure. So, when a fireman wishes to replenish the sand box of his locomotive, he has simply to insert into it the end of the pipe leading from the tank. A turn on the convenient valve handle, and the sand is pushed up from the tank and into the sand box. With this efficient equipment the operation requires only 10 seconds.

¶ Canada's magnificent potentialities are demonstrated by the fact that of her 2,300,000,000 acres of land area only 39,000,000 are now under cultivation.

Popular Mechanics features will appear in moving pictures issued by Paramount Magazine.

UNUSUAL FACTORY BUILDING INCLUDES FOUR WINGS

Believing fresh air and sunlight conducive to good workmanship, a manufacturing company in a middle-western city is erecting a plant on lines which will provide employes with these in abundance. Two divergent wings will connect with the main portion of the building at either end, making the ground plan of the structure resemble two immense "Y's," joined at their lower ends. Most of the extensive wall space will be taken up by windows. This type of construction is unusual for factories, though many examples of it are to be seen in apartment buildings, hotels, and hospitals.



Fresh Air and Sunlight can Enter This Unusual Manufacturing Plant from Many Angles. It is being Erected in a Middle-Western City and will Cost $150,000

¶ It is believed that patrons of New York City's Fifth Avenue busses will soon be protected from the rain by removable tops which will cover the upper decks.

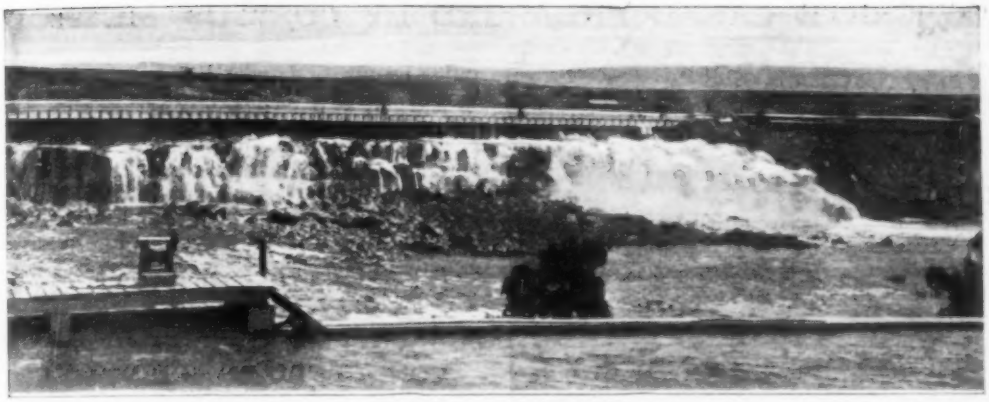
METAL FISH HELPED TRACK GERMAN U-BOATS

The story of the two submarine-hunting sea lions was told in the July issue of this magazine. The venture was remarkable in itself; yet even more so is a mechanical application developed from the experiments and lately revealed at a conference of British scientists. Sea lions were found to have their limitations; the "personal equation" was too prominent. So, hollow bodies, shaped like seals or porpoises, were made of very thin metal and equipped with hydrophones in the center of the heads. Such a metal fish was filled with water and towed by a vessel of the submarine patrol. Inclosed in the towing cable were wires which led to sensitive telephone transmitters on board the vessel. Dragged at the end of a very long towing cable to eliminate local noises, the metal fish often gave warning of enemy submarines at surprising distances.

STORAGE-BATTERY LOCOMOTIVE PULLS FORTY-CAR TRAIN

Mining locomotives usually confine their services to subterranean levels, and seldom appear in public. A certain Colorado metal mine, however, has 1½ miles of its 5½-mile track system above ground, and a little locomotive, less than the height of a man, is commonly seen pulling upward of 30 ore cars with neither

Mining Locomotive Driven by a Storage Battery of 208 Cells, Hauling an Astonishing Load along the Surface Track Pulled a Total of 40 Ore Cars, Each of 2½ Tons, Negotiating the Low Grades of the Run without Trouble. The Length



An Elaborate Illuminating System, Installed during the War, Consisting of Powerful Searchlights and Thousands of Incandescent Lamps, Prevented Enemy Agents from Destroying This Great Irrigation Dam across the Snake River, near Twin Falls, Idaho

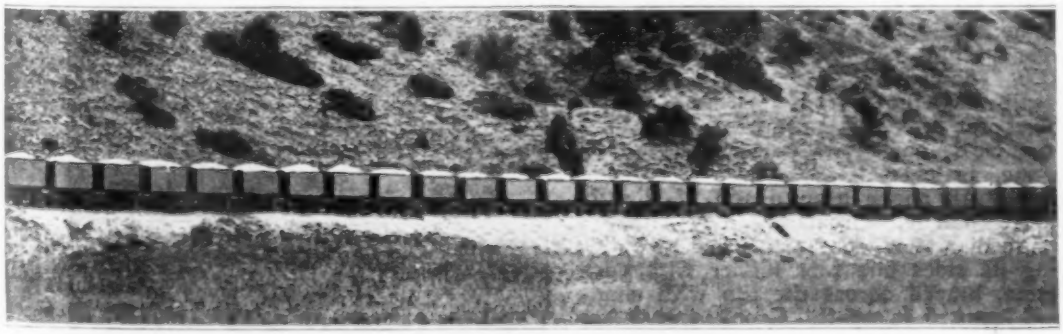
smoke nor trolley. A 208-cell storage battery of the nickel-iron variety, installed in the tender, supplies the power, which is so great that in a recent test the electric engine hauled a 40-car train of 2½-ton cars with ease, even over the light grades of the right of way.

DIAMOND HUNTERS TO SEARCH RIVER BED IN DIVING BELLS

Forming the bottom of the deep pools along the Vaal River in southern Africa are virgin diamond beds which will shortly be the scene of unusual mining operations. A shallow-draft boat, anchored on the surface of such a pool, will lower to the bottom a diving bell, 15 ft. in diameter, in which will labor several native workers. These will shovel the gravel into the mouth of a compressed-air hoist. By this means it will ascend to the deck, on which will be found the usual equipment of bins, revolving sieves, and sorting tables, in addition to the boilers and engines.

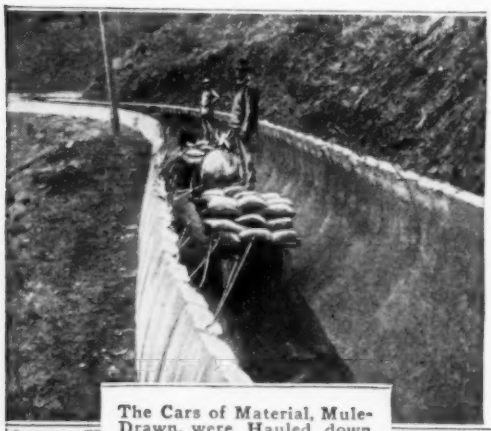
GUARD BIG IRRIGATION DAM BY ILLUMINATING RIVER

A terrific blow to agricultural interests could be delivered by the destruction of a mammoth dam across Snake River, near Twin Falls, Idaho, as water impounded by the structure irrigates and renders productive a large tract of land in that vicinity. During the war there were rumors that enemy agents were plotting to blow up the obstruction, and these reports so alarmed local residents and authorities that unusual means were taken to protect the dam. A strong guard was maintained on the site at all times, while powerful searchlights were installed along the river to illuminate the stream at night. The dam itself was lighted by thousands of electric bulbs, many of them colored. Written permission was necessary before the structure could be crossed. Since the signing of the armistice, the guard has been withdrawn, but the illuminating system is still in service. The dam is a gorgeous sight when this is in operation.



of a Western Metal Mine: The Locomotive's Height Is Less Than That of a Man, Yet in the Test Pictured Here It of Track above Ground, on Which Such Hauling is Done, Is 1½ Miles, There Being Four Miles Underground

CONCRETE CANAL ENLARGED BY CURIOUS METHOD



The Cars of Material, Mule-Drawn, were Hauled down the Center of the Canal Itself

The Cars were First Hauled up the Mountain Side by Cables

The Yakima-Tieton irrigation canal, in the state of Washington, has recently had its capacity increased from 300 cu. ft. per second to 350. The canal, really an aqueduct of reinforced concrete, is practically all above ground and of slightly more than half-circular section, 8 ft. 3⅝ in. in diameter. It was enlarged by building its sides one foot higher with concrete, braced across the top with channel irons, 5 ft. apart. Grooves were cut along the top of the old concrete to key the new. Materials were hauled in 15 miles by motor truck; but a considerable length of the canal is inaccessible by road, and runs at the foot of a sheer cliff. Along this portion the material was hauled in small cars running on the concrete bottom of the canal itself, drawn by mules, after the original concrete cross braces had been removed. By this expedient, the work of raising the walls was carried on without interruption.

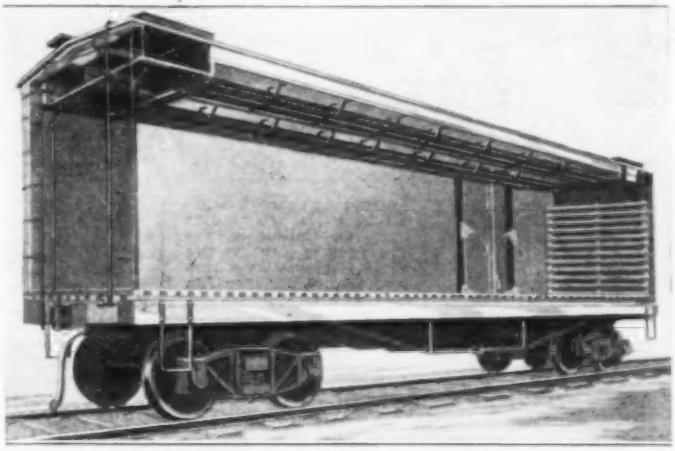
Above, Forms in Place for the Concrete Additions to the Canal. At Right, Workmen Using Boards Laid on the Cross Braces as a Platform While Building Up the Canal's Height

SEARCH FOR INFLUENZA GERM CONDUCTED BY SCIENTISTS

Until the germ which causes influenza has been discovered, no reliable vaccine for the prevention of the disease can be produced. For that reason four of the most prominent scientists in the country are working together in a systematic search for the elusive bacillus. Serums now employed contain pneumonia germs and other bacilli, but the results obtained from their use show them to be of uncertain value. Influenza itself is declared by medical authorities to be fatal only in rare instances, but dangerous in that it prepares the way for attacks of pneumonia, which causes many deaths. An effective serum will do much to prevent the recurrence of epidemics like that of last year.

SWAYING MOTION OF TRAINS CIRCULATES COLD BRINE

The swaying motion of moving railroad trains is utilized for circulating chilled brine through the pipes of a new installation for refrigerator cars that is said to maintain a more even temperature than is possible with any present system. Two overhead tanks are placed at either end of a car, and connected by a number of pipes, hung a few inches below the ceiling. Each tank is divided by a partition paralleling the ridge of the roof, and in each partition are four automatic check valves, opening to the right in one tank, and to the left in the other. Ice and salt are placed in the tanks, and the weight of the resultant brine opens and closes the sets of valves alternately, depending on the direction of the car's sway. The installation can be used for heating by shutting off the overhead pipes, injecting steam into the tanks, and circulating the brine thus heated through two pipes connected to the tanks and laid on the floor. Low cost of operation is one of the advantages claimed for the device.



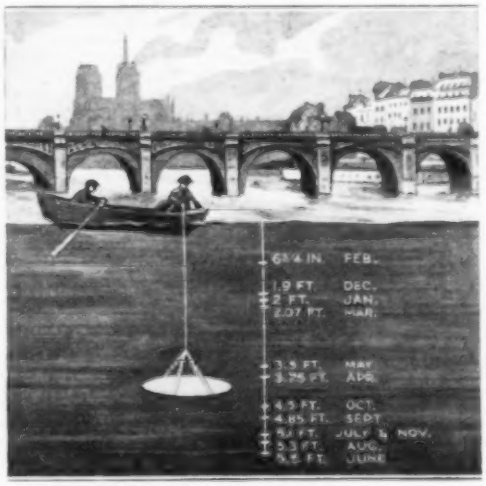
Automatic Cooling System Installed in a Refrigerator Car: This View Shows the Arrangement of the Brine Tanks and the Overhead Pipes in Which the Cold Fluid Circulates

AMERICAN SALESMEN IN FRANCE NEED BUSINESS CREDENTIALS

Every American commercial traveler in France is compelled by a recent law to secure from his firm a card of identification which must be viséd by the nearest chamber of commerce in the United States. All foreigners in France are affected alike by the law, as well as by the penalty for disobedience.

TEST WATER IN RIVER SEINE FOR TRANSPARENCY

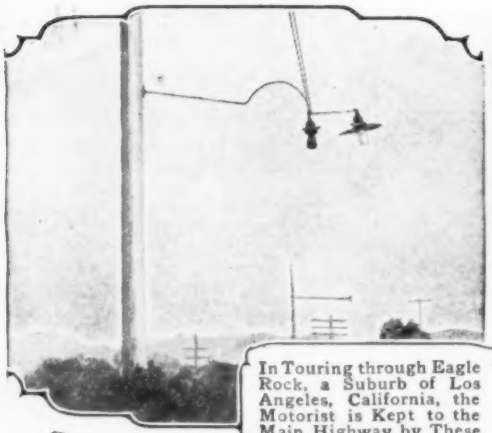
Tests made to determine the transparency of the water in the River Seine in Paris have resulted in the discovery that this varies considerably for different months of the year. The apparatus used in the tests consists of a sheet-metal disk, painted white, and slung at the end of a small rope. The disk is lowered into the stream from a boat until it becomes invisible to the observers. A mark is made on the rope at the surface of the water, and thus the depth at which the disk vanishes is learned. Generally speaking, the water is more transparent in warm weather than in cold. The disk disappeared at 6¾ in. beneath the surface in February, but could be seen at 5½ ft. in June.



BY COURTESY OF LA SCIENCE ET LA VIE

Device for Testing the Transparency of the River Seine: The Scale Shows How This Varies for Different Months of the Year

CIVIC FEATURES THAT PROMOTE THE COMFORT



In Touring through Eagle Rock, a Suburb of Los Angeles, California, the Motorist is Kept to the Main Highway by These Red Lights, Placed One at Every Turn

Determined to Prevent a Repetition of a Grade-Crossing Disaster That Cost a Life, the Citizens of Topsham, Maine, have Posted near the Tracks This Arresting Sign

Covering Their Routes on Schedule Time, Cleaning Crews Like the Above Keep the Street Lamps of Indianapolis, Indiana, Bright and Clean. The Wagons Carry Boiling Water, Cloths, and Extra Parts

The "Safety Zones" on the Business Streets of Chattanooga, Tennessee, are Marked by Elevated Concrete Platforms, Instead of the Posts and Chains Employed in Many Cities

AND ENJOYMENT OF VISITORS AND RESIDENTS

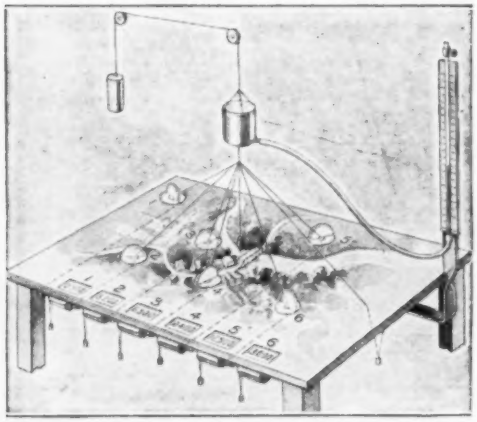
The Poor of Harrisburg, Pennsylvania, are Carried Free in This "Carryall" to Near-By Woods and Parks. The Car has Traveled 15,000 Miles on Its Errands of Mercy

These Concrete Tables and Benches have been Built in a Picturesque Cañon by the People of San Bernardino, California, as a Convenience to Picnickers and Motor Tourists

This Wrecking Truck Is Part of the Equipment of the Boston Fire Department. It Weighs Seven Tons and is Used to Pull Down Walls at Fires, to Tow In Wrecked Apparatus, and for a Dozen Other Purposes

ANTI-AIRCRAFT FIRE CONTROL SIMPLIFIED BY CALCULATOR

The army officer assigned to the anti-aircraft artillery has hitherto been regarded by his comrades of the line as a



As the Can is Moved over the Terrain Board to Simulate the Flight of a Hostile Airplane, the Drums Corresponding to the Anti-Aircraft Batteries Register the Ranges. The Water Gauge Registers Altitude

mathematical prodigy, with head full of figures, formulas, and mystic symbols. Now appears a mechanical apparatus prepared to do most of his calculating for him. Over a terrain board representing the battle area hangs an object which is moved in exact correspondence with the flight of the hostile air craft. From this object cords stretch down to positions of friendly batteries and searchlights. Here the cords wind on registering drums to show the range in yards from each station to the target. Similarly, at each gun or searchlight station is a vertical quadrant, free to revolve over a horizontal, graduated circle, making it easy to read at a glance the angles of elevation and deflection for each station.

FIRST FREE BALLOON FLOATS OVER NEW YORK CITY

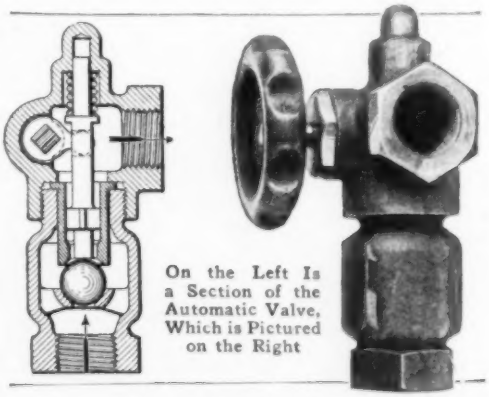
The people of New York City recently witnessed for the first time the passage over their busy streets of a free balloon. The bag was of the largest type used in the navy, holding 35,000 cu. ft. of hydrogen gas. In the basket, 1,500 ft. above the crowds, rode four naval officers who threw overboard thousands of enlistment circulars when not busy with the management of their craft. After drifting for six hours, a rainstorm drove them to earth in New Jersey.

WAR VETERAN ASPHYXIATED IN TEST OF GAS MASK

The tragic asphyxiation of an American veteran of the great war lends force to the warnings published several times by this magazine. The army gas mask is not intended for promiscuous use; it is designed solely for protection against the few gases used in warfare. This veteran attempted to test his mask by putting it on, and then opening three gas jets in the kitchen of his home. His mother returned half an hour later, to be guided by the smell of gas to the kitchen, where she found her son a crumpled heap upon the floor, stone-dead.

AUTOMATIC VALVE CLOSES WHEN PIPE BURSTS

A valve that closes automatically to stop the flow of liquid, steam, or gas in a broken pipe has been placed on the market. The device is constructed so that sudden reduction of the pressure on the outlet side, which would ensue if a pipe burst, causes the pressure on the inlet side to push a ball into a seat, thus closing the valve. Under normal conditions, the ball is held away from the seat by a spring. To reopen the valve after it has closed itself, it is necessary to employ a handwheel provided for that purpose. The manufacturers recommend the device for use in pipes supplying oil



On the Left Is a Section of the Automatic Valve, Which is Pictured on the Right

to large burners, where an explosion might result from the continued flow of fuel from a ruptured pipe.

¶Aerial mail service for Brazil will be inaugurated as soon as an expected appropriation for that purpose has been made by the proper authority.

Locomotive Driven by Air Screws, Which are Mounted on the Shafts of Vertical Engines at Front and Rear of the Coach: The Big Truck Weighs 14 Tons, Carries 40 Passengers, and Runs at High Speeds

AIR-PROPELLED LOCOMOTIVE IS EUROPEAN NOVELTY

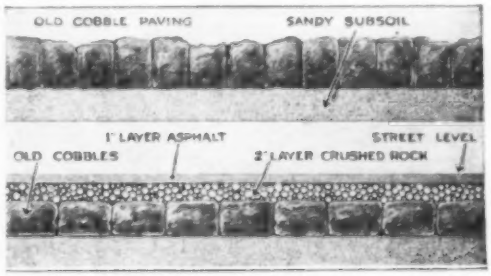
The rapid development of the air screw and of the power for driving it, and its remarkable efficiency, are encouraging its use even in applications where a more substantial traction is available. Many boats have adopted it as a successful substitute for the underwater propeller, and motor trucks have been experimentally driven at high rates of speed. Now a European builder has incorporated the air-drive principle into a 14-ton 40-passenger locomotive. The two vertical engines are mounted outside the body of the coach, front and rear, with a powerful air screw on the shaft of each, and the big truck runs at express-train speed.

COST OF STREET-CAR RIDES VARIES WITH LENGTH

Fares vary according to the distance individuals are carried on the street cars in Newark, N. J., where a novel system of collecting has been inaugurated. The city is divided into zones, and when a passenger boards a car ,he is given a check that indicates in which one of these he started to ride. As he leaves the car he presents this check to a conductor, who computes the fare to be paid on the basis of three cents for the first zone traversed, and two cents for each additional zone. Passengers enter at the front of the cars and alight at the rear.

COBBLESTONES USED AS BASE FOR ASPHALT PAVEMENT

After serving for years as pavement on one of the principal business streets of Cleveland, Ohio, old-fashioned cobblestones were taken up recently, and now form the base of a modern asphalt thoroughfare in the same location. The stone blocks had been laid on edge in sandy soil, so their removal was an easy task. After they had been cleaned and a few inches taken off their former foundation, the stones were relaid, this time on their sides. On top of them was placed a 2-in. layer of crushed rock, bound together with tar, and over this was spread the surface layer of asphalt, 1 in. thick. The

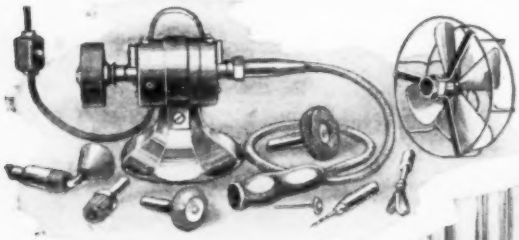


At the Top Is a Section of the Old Pavement. How the Cobblestones were Used in the New Street Covering is Pictured Below

utilization of the cobblestones reduced the cost of the new pavement by making unnecessary the purchase of much new material.

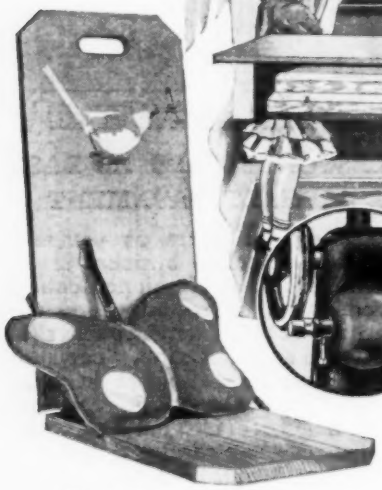
Popular Mechanics features will appear in moving pictures issued by Paramount Magazine.

SOME NOVEL AND LITTLE-KNOWN ACCESSORIES



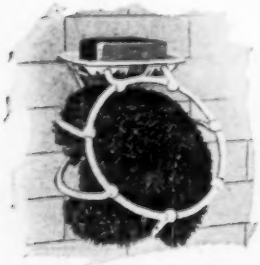
Among the Set of Attachments for This Little Electric Motor Are a Flexible Power Shaft, an Egg Beater, a Fan, and a Drill

Made of White Porcelain, a New Lighting Fixture Serves Admirably All Night in the Bedroom of an Infant, or in the Hall, as It Contains Only One Small Electric Bulb, Shaded to Produce a Subdued Glow

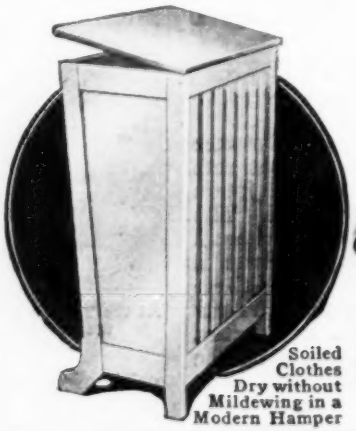


Beach Chair with Pneumatic Cushion: When the Air is Released from the Latter, the Back and Seat can be Folded for Carrying

When Closed, This Electrically Driven Sewing Machine Resembles a Writing Desk, as Shown at the Right. The Motor is Permanently Attached, as Shown in the Circle. Its Speed is Controlled by a Switch Designed to be Operated by Pressing with the Knee



Attached to the Wall beside a Tub, This Simple Device Holds a Sponge and a Cake of Soap within Easy Reach of a Bather



Soiled Clothes Dry without Mildewing in a Modern Hamper

A Sole Tip of Rubber, Studded with Small Knobs of Leather, is Intended to Prevent the Foot Throttle of an Automobile from Wearing Out the Shoes of a Driver Who Spends Much Time at the Wheel

INTENDED FOR THE HOME AND ITS MEMBERS

More Like a Traveling Bag Than a Kennel in Appearance, This Ventilated Fiber Case can be Carried on a Train or Street Car with a Small Dog or a Cat Comfortably Hidden Inside. A Patent-Leather Curtain can be Rolled over the Larger Air Hole and Fastened in Place with Snaps

An Artistic Shade for the Nursery Lamp: The Cunning Silhouette is Placed between Two Pieces of Transparent Silk

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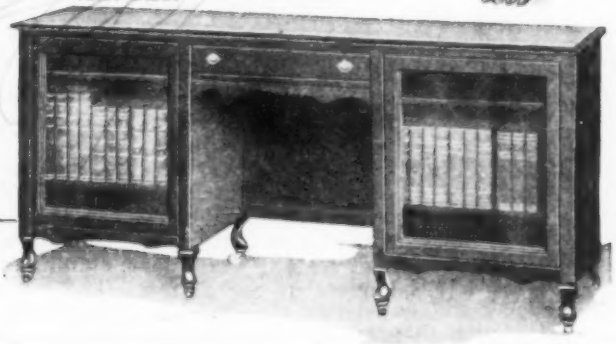
Embroidering Is Neither Tiresome nor Slow with This Machine, Which will Finish in an Hour a Piece of Fancy Work That would Require Two Weeks to Complete with a Needle. It is Operated by Manipulating the Center Rod, and Obtains Its Supply of Thread from the Two Spools

A Compact, Inconspicuous Anti-Influenza Nose and Throat Sprayer That can be Carried in a Woman's Pocketbook

Designed for Persons Who have Lost an Arm, the Combination Knife and Fork can be Converted from One to the Other by Changing the Position of the Semicircular Blade

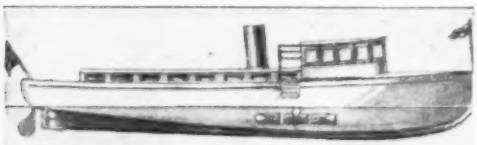
A Replaceable Paper Tape, Coated with Material on Which to Strike Safety Matches, is Wound on a Reel in the Center of This New Ash Tray



The Conveniences of a Flat-Top Desk and Those of a Bookcase are Combined in This Piece of Furniture, Which Is as Useful as It Is Ornamental

MARINE PROPELLER REVOLVES PARALLEL WITH SHIP'S SIDE

Ship's propellers have been placed at the stern since the days of John Ericsson; yet an inventor now proposes to range any



This Propeller Is Really a Paddle Wheel. Any Number of Them Desired may Revolve along the Ship's Side

number of propellers along the sides of the ship, with the blades revolving parallel with the sides. His propeller is really a paddle wheel, of course, rotating below the water line. Through a hole in the end of each transverse driving shaft extends a movable rod bearing the two propeller blades, which are fixed at right angles to each other. As each blade finishes its power stroke a cam wheel on the rod engages with a slot on the main-shaft bearing, turning the blade through a right angle so that it makes the upper part of each cycle on edge, offering no resistance to the progress of the ship. Besides an increase in speed, the inventor believes that these propellers will effect a decided gain in maneuvering ability.

PAPER RIVETER AND PUNCH LIKE TWO-JAWED PLIERS

Two useful office devices are combined in one simple tool by the manufacturers of a patented paper riveter and punch, which resembles a pair of pliers with double jaws. One of the jaws is designed to fasten together sheets of paper with tubular rivets of soft metal, while the other comprises a perforator for making circular holes in the same material. The jaw used as a riveter can also be employed for removing clinched rivets.

OVER-SEA DEAD CANNOT BE CARRIED TO AMERICA

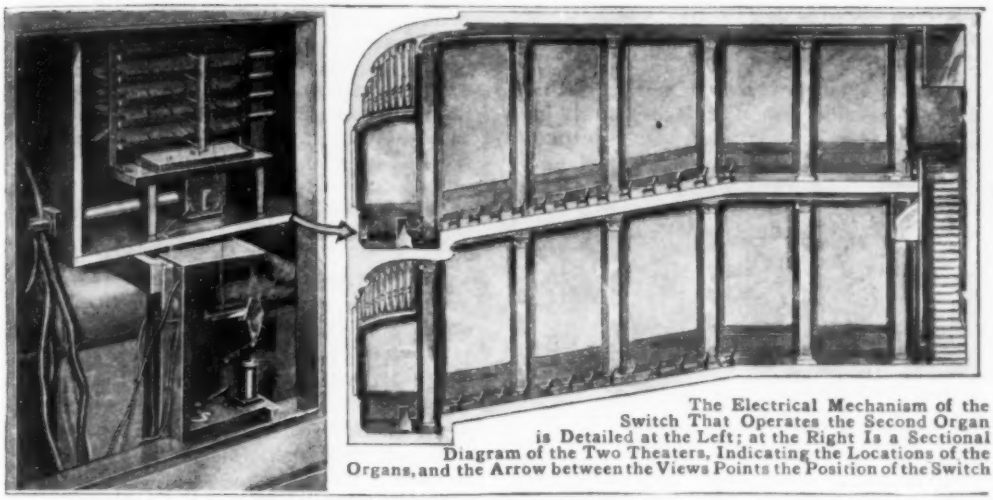
Lack of railroad transportation is the reason given for the French refusal to permit the exhuming of America's soldier-dead and their return to their native soil. Not for three years will the ban be lifted. This unexpected decree of the French president has brought the keenest disappointment to many American parents, who have reached Paris only to learn that their mission of love is in vain. It is also unfortunate that no bodies can be brought into France from Luxemburg or Germany.

ODD USE OF GRAVITY MADE IN NEW REMINDER CLOCK

Reminder clocks have long proved themselves useful to business and professional men, and are even valued by many housewives. Different from any yet produced, however, is a new clock in which gravity is put to a novel use. At the base of the case is a metal cup in which are many polished steel balls. Around the dial are 48 holes, one for each quarter hour. Behind the holes a slotted disk turns with the hour hand. So when the appointments for the next 12 hours are made the owner of the clock places a steel ball in each appropriate hole. At each appointed minute the slot in the hidden disk tallies with the proper hole, permitting a ball to roll to the base of the clock. Here it makes an electric contact and rings a bell or buzzer, until a touch on a button releases it and allows it to fall back into the cup.

ORGANS OF TWO MOVIE HOUSES PLAYED BY ONE ORGANIST

The peculiar construction of a pair of picture theaters in Cleveland suggested an ingenious arrangement, just completed, whereby one organist can play simultaneously the organs of both houses. The two theaters are built one above the other, opening on two streets at different levels. Each has its own pipe organ, ordinarily played independently to suit the



The Electrical Mechanism of the Switch That Operates the Second Organ is Detailed at the Left; at the Right Is a Sectional Diagram of the Two Theaters, Indicating the Locations of the Organs, and the Arrow between the Views Points the Position of the Switch

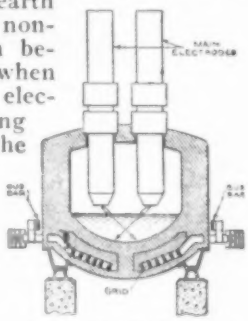
pictures on its own screen. By making an electric switch with as many contacts as the organs have pipes, and connecting the electrically played instruments to the switch, both sets of pipes are made to play in unison when either keyboard is operated. The contact switch, and also a master switch are controlled by solenoids connected to push buttons on the organs. The two organists, working in shifts, use a buzzer system for signaling when they take their rest periods, at which time the switch is thrown and the instruments play together.

USE METAL CAR-FARE TOKENS ON STREET RAILWAYS

Metal tokens issued by a street-railway company operating in St. Louis are accepted on city cars in lieu of odd-cent fares, thus simplifying the work of conductors and obviating the necessity for a large supply of pennies. Those used by children are of bronze, about the size and shape of a nickel, and are sold at a reduced price when purchased in quantities. They are equivalent in value to four cents. Tokens for adults are sold at slightly under eight cents each when a number are bought at one time.

HEARTH FORMS ONE ELECTRODE OF NEW ELECTRIC FURNACE

An improved form of electric-arc furnace, recently designed in England, uses as one electrode a hearth of material, normally non-conducting, which becomes a conductor when heated. The main electrodes, corresponding in number to the single, two, or three-phase current supplied, and one auxiliary electrode, enter the top of the furnace. To start with a cold charge, the auxiliary electrode is lowered into contact with the metal, and an arc drawn between the surface and the main electrodes. By the time the metal begins to melt, the hearth has heated and become a conductor, and the auxiliary electrode is withdrawn. The hearth of the two-phase furnace, which is the one shown in the sketch, has two conductor grids, so arranged and connected that the currents from the two main electrodes cross each other in the metal, assuring a thoroughly mixed charge.



BY COURTESY OF THE ELECTRICIAN

¶ One of the many species of American holly, the one known scientifically as "Ilex vomitoria," has been found by chemists to contain large amounts of the drug caffeine, one to one and a half per cent being available from the dried leaves.

PREPARATION OF HEAVY FUEL FOR TRUCKS AND TRACTORS

For the use of heavy fuels, such as kerosene, alcohol, distillates, and low-grade gasoline in trucks and tractors, a

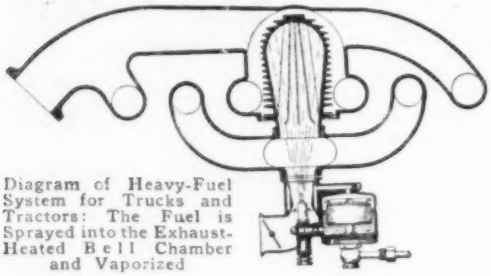
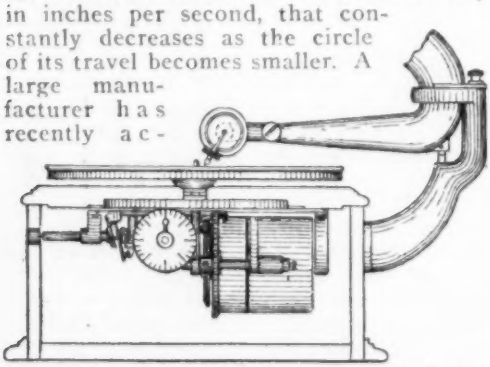


Diagram of Heavy-Fuel System for Trucks and Tractors: The Fuel is Sprayed into the Exhaust-Heated Bell Chamber and Vaporized

new system of preparation is announced. The spraying nozzle of the carburetor divides the fuel into extremely fine particles. These are thrown forward with high velocity into a bell chamber heated by the exhaust gas, while the air, lacking the inertia of the fuel particles, does not enter. The pressure being at a minimum, the fuel is instantly vaporized, and then passes into the mixture. The relations of heat and pressure are carefully studied in the device, and a constant temperature is maintained in the mixture at all speeds.

RECORDS IN NEW PHONOGRAPH MOVE AT CONSTANT SPEED

In an ordinary disk phonograph, the record moves under the needle at a rate, in inches per second, that constantly decreases as the circle of its travel becomes smaller. A large manufacturer has recently ac-

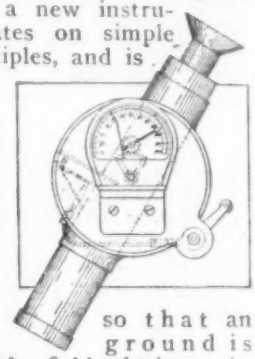


At the Left of the Speed-Indicating Dial, Seen in the Center, Is the Cam Mechanism for Adjusting the Linear Speed of the Record

quired an invention which increases the rotational speed of the disk as the needle approaches the center, in exact proportion to the decrease in groove diameter. This is accomplished by means of a slowly moving cam, which gradually changes the position of the friction plate on the governor, allowing the motor to run faster and faster. The same process must, of course, be used in the manufacture of records for use with the machine, the result being a uniform range of vibration values, intended to improve the reproducing effect. The cam may be manually thrown out of action for the use of ordinary records, the machine then running at uniform speed as in present practice.

INDICATOR SHOWS AIRPLANE GROUND SPEED DIRECTLY

If the hopes of the inventor are justified, the equipment of the aerial navigator will soon include a new instrument which operates on simple trigonometric principles, and is intended to indicate the speed of the air craft relative to the earth. A telescope, or sighting tube, pivotally mounted on the framework of the cockpit, is moved by means of a hand crank so that an object on the ground is kept constantly in the field of view. As the crank is turned, a pointer moves slowly across a dial graduated in miles per hour. Secured to one side of the telescope, its face perpendicular to the line of vision, is a stop watch with an elongated second hand that swings into the tube of the telescope and becomes visible to the observer only at the bottom of its revolution. The navigator continues to turn the crank, keeping the ground point always in view, until the hand of the stop watch swings into his line of vision. At that instant he arrests the crank and reads from the indicator dial the true speed of his craft in miles per hour.



MEN'S TAILORS WOULD REVIVE STOCKS AND KNEE BREECHES

Strolling along the astounded streets, displaying themselves to public and social gatherings, 1,000 young dandies are expected soon to demonstrate to the people of London a reactionary change in fashions sponsored by a group of local tailors. Perhaps the tailors will not be able to find so many men of iron nerve. It is a fact, nevertheless, that they hope to revive in part the fashions of the

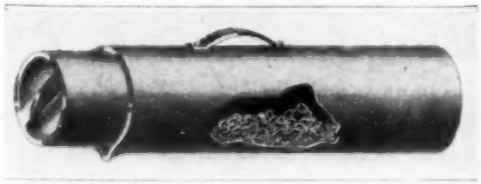
18th century. They would dress the smart English business man in plum-colored lounge coat and knee breeches, a white stock is to show above his yellow waistcoat, his shapely calves are to reveal themselves in black hose, while silver buckles will adorn his shoes.

WORTHLESS DESERT SHRUB YIELDS NEW ALKALOID

Two years before the war, as the story is told, two German chemists applied for permission to experiment with the plant life on a great semiarid ranch in central Mexico. Their request was granted, with the understanding that they furnish a complete report of their findings. The two chemists worked feverishly, and chiefly on a squat, odorous shrub called "gobernadora," long reputed to possess medicinal properties. Suddenly they disappeared; what they had discovered was never known. Now, after experiments with this same desert shrub which they have found in the drier parts of New Mexico, chemists of the U. S. Department of Agriculture believe that they have discovered another alkaloid to add to the list which already includes morphine, quinine, and cocaine. Its chemical and pharmaceutical properties are now under investigation.

TELESCOPIC METAL CARRIER FOR AUTO-TIRE CHAINS

Mud-covered automobile-tire chains are prevented from soiling a car when stowed in a new case, for which a patent has been asked. The container consists of two sheet-metal cylinders, open at one end, which telescope together and are held in position by springs protruding through slots in the smaller member. Liquids can be carried in the disjointed sections. To facilitate pouring, the larger section has a lip on its open end, and a handle on its curved surface. Besides, handles are provided at the closed ends of both cylinders.



If Placed in This Telescopic Metal Case, the Parts of Which can be Used as Buckets, Mud-Covered Tire Chains cannot Soil a Motor Car

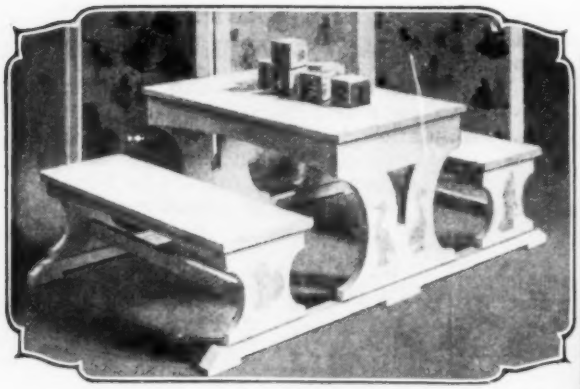
SECTIONAL LADDER CAPABLE OF EASY TRANSFORMATION

A stepladder which can be converted into an extension ladder by simple manipulation has been patented by a Chicago inventor. Three sections are hinged together, one fitted with flat steps, and two with round rungs. When the device is used as a stepladder, the intermediate portion serves as a prop for the step-equipped, or bottom, section, while the top section is attached to the underside of the lower step and acts as a brace. By alining the three sections, a ladder of considerable length is obtained. If a shorter ladder is desired, the two lower sections can be used. To use the ladder on a stairway, the lower section is placed with its free end on a step, and serves as a prop for the other two. Locks are provided at the joints for holding the parts in position after they are alined.

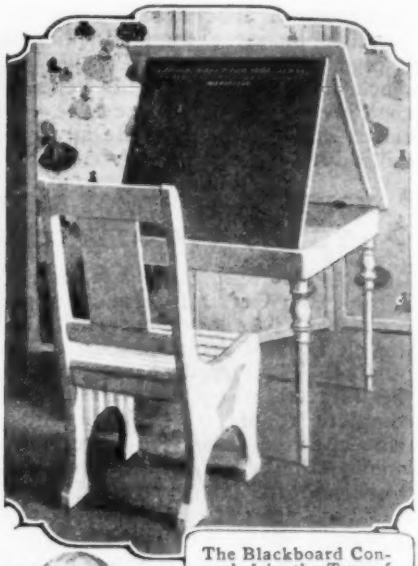
Three Ways of Using the Combination Ladder are Illustrated. Below, the Device is Shown with Its Sections Folded

SOFT OPTICAL GLASS EASILY DENTED OR CORRODED

Most persons think of glass in terms of bottles or window panes, and are not aware that some forms of optical glass are extremely soft, and scratch very easily. The sensitive surface may even be dented, and a drop of water left to evaporate is likely to cause a permanently corroded spot, for which there is no possible remedy. A film of moisture acts the same way, removing the delicate polish and pitting the surface until the colors of interference, or a yellow stain, spoils its usefulness. Fine lenses should always be covered when not in use.

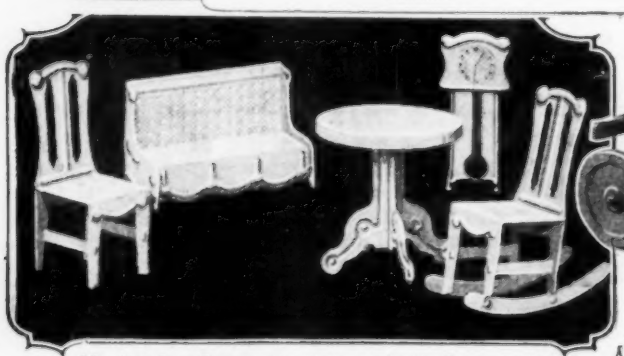


With This Permanent Combination of Nursery Table and Benches Baby Finds It Is Very Convenient to Entertain a Visiting Friend with a "Quiet Little Game" of Blocks



The Blackboard Concealed in the Tray of This Enameled Nursery Table Swings into Place as the Top is Lifted. The Alphabet at the Top Challenges the Child's Skill

The Pleasure Car at the Right Becomes the Business Car at the Left by Adding the Wheelbarrow Body. Clamps Hold the Body in Place While a Hook Locks the Steering Column



Moving Day Recurs So Frequently in Every Doll House That Furniture Breakage Is Considerable. This Parlor Set will Last Longer Than the House, However, as Every Piece is Made of Steel. The Furniture may be Had in Blue, Pink, or White Enamel

This "Pushmobile" for the Little Fellow Steers with a Wheel. Ropes from the Axle Wind around a Drum at the Base of the Steering Column

Even More Fascinating Than the Movable Scenery in This Little Cardboard Theater Are the "Characters" Who Move About as the Magnet beneath the Stage Pulls at Their Metal Bases

Bobbing Downand Back, the Little Figures Carefully Pick Their Way down the Staircase. They are Given the Peculiar Motion by Their Triangular Mountings Which Are Longer Than Each Step, and So Tilt Forward and Slide from One Tread to Another

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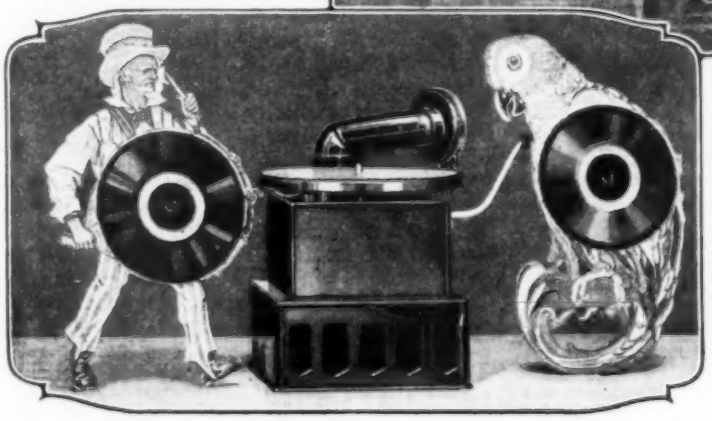
With One Hand in the Culprit's Hair, the Other Is Free to Wield the Electric Spanker. Most American Boys and Girls will Consider This Machine a Joke



The Miniature Phonograph in the Center is Built Sturdily to Withstand the Loving Assaults of the Youngsters. The Cardboard Figures at Right and Left Bear Little Records Which Yield Appropriate Music. Uncle Sam Plays a Patriotic March, While the Parrot Imitates the Birds of the Forest

REMOVABLE SIGNET CONCEALS IDENTIFICATION DISK

Though conventional in appearance, a new finger ring ingeniously conceals certain means for identifying its owner. This is made possible by a removable signet, designed to be screwed to the band over a circular recess, which is converted in this way into a water-tight compartment for holding a disk of metal or paper bearing the name and description of the person to whom the jewelry belongs.

CLEATED PLATES HELP CARS IN MUD AND SAND

To assist in the extrication of automobiles from mud holes and deep sand, novel attachments for the rear wheels of cars have been placed on the market by a Wisconsin inventor-manufacturer. These are metal plates, resembling sections of cleated tractor-wheel rims, shaped to fit over casing treads. Straps fasten the plates to the tires. A wide, nonslipping surface is thus provided, which enables a machine to run over difficult spots under its own power. One plate is intended to be applied to each rear wheel.

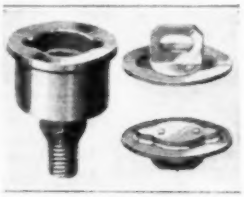
SHAVING ARTICLES COMBINED IN SMALL ALUMINUM CASE

Three shaving conveniences are compactly arranged in a small cylindrical aluminum case which recently appeared on the market. A talcum-powder can, fitted with a perforated cover, telescopes into a tubular receptacle which serves as a brush handle and as a container for shaving cream. Pushing the can into the handle forces cream through a tube into the bristles. Holes in the cap which fits over one end of the case admit air for drying the brush.

Combination Shaving Brush, Cream Container, and Talcum-Powder Can: The Conveniences are Packed in a Ventilated Aluminum Case

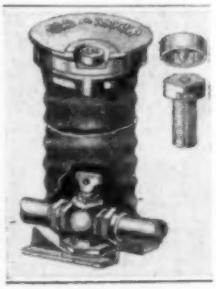
NEW AUTOMOBILE GREASE CUP HAS HANDLE ON COVER

An automobile grease cup which can be filled and manipulated without soiling the hands, according to its inventor, has appeared on the market. It is equipped with a quick-detachable cover which can be removed by turning a small projection, or handle, designed to be grasped by the thumb and forefinger, or locked in the same manner. When the cover is locked, the cap into which it fits can be screwed down to force lubricant from the cup into a bearing by turning the handle in the proper direction.

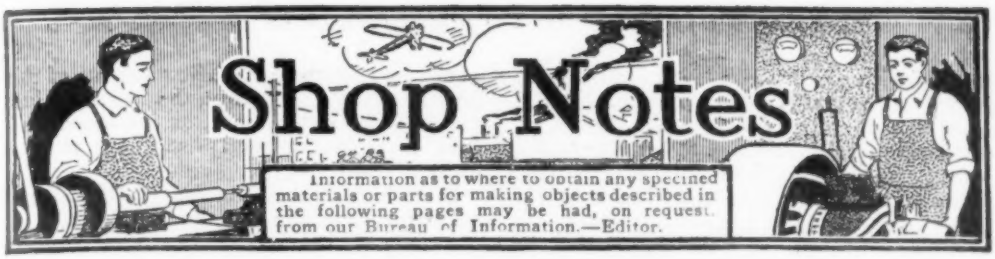


VALVE-BOX COVERS SEALED WITH CAST-IRON CAP

A contrivance intended to prevent the unauthorized removal of covers from tubular water and gas-valve boxes, commonly buried in the ground outside residences, has been patented by an Ohioan. It is a circular cap, or seal, of cast iron, designed to fit over the head of the brass bolt which fastens the cover, and to lock in that position so that it cannot be removed until it is broken. With the seal in place, it is impossible to turn the bolt. A small spring, set in a hole in the head of the bolt, and a pin of special shape inside the cap constitute the locking device.



¶The old War College at Washington, D. C., has been reorganized and rechristened the "General Staff College of the United States Army."



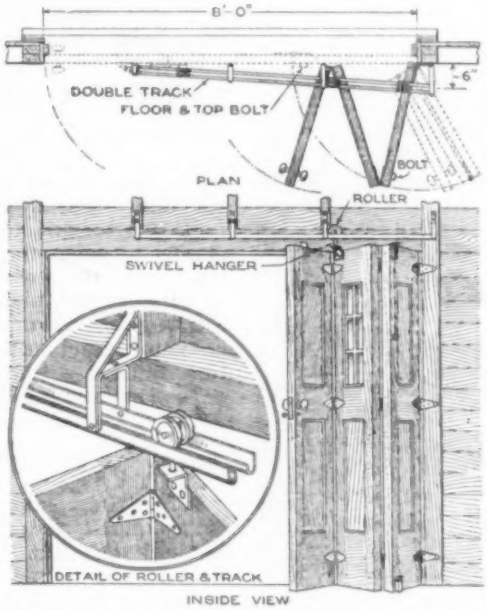
Folding Doors for the Garage

By P. P. AVERY

ALL of the common types of garage doors have their advantages and disadvantages. Large doors opening outward will warp, and always require a clear space for swinging, the wind blows them about, and wears out the fastenings. Sliding doors, if placed inside, need a long space on one side; or if two doors are used, it takes double labor to operate them. Sliding doors placed outside are perhaps the most satisfactory of the common types, as they are subject only to warping and other effects of the weather.

The door illustrated is intended to overcome all these objections. It can be readily constructed without any special manufactured fittings, and can be made as secure against burglary as any of the types mentioned above. The only space required is within a radius of about 3 ft. from the hinged side, and within 3 ft. inside from the door casing. If the car cannot be moved more than 3 ft. inside from the door, there may be difficulty in installing such a door, and this condition must be carefully investigated before deciding on it. The required amount of space should be available in a well-designed garage, in order to facilitate handling the car.

The door is built in three sections. One of these is hinged to the casing by inside hinges, and the other two are hinged together as shown. The doors are closed merely by grasping the door knob and pulling it over to the other side of the casing, where an ordinary door lock is sufficient. The right-hand section is provided with two bolts, of the ordinary floor and ceiling type. These, in connection with the door latch and lock, are sufficient to secure the doors, unless one wishes to guard against forcing in the two left-hand sections by pressure applied to the joint between them. This may be taken care of by adding floor and top bolts to the left section, similar to those on the right one. The doors are opened merely by pulling on the chain which hangs from the top bolt, as shown. Thus the same motion which unbolts the door from the top, pulls it open. The section carrying the knob may have to be folded back separately, but this is the work of only a second. The dotted lines show the position of the doors when open.



The Use of a Swivel Hanger for the Roller Working on the Track Makes Possible a Garage Door of Extraordinary Convenience

The satisfactory construction and operation of doors of this kind depends on the use and proper placing of the swivel hanger which is attached to the center section. At the top of this hanger are two rollers which work on a double steel track. This track should be built first, before placing the hanger. The doors are then closed, and the approxi-

mate position for the hanger determined by reference to the upper diagram. Then open the doors to the position shown by the dotted lines, and note whether this brings the center point of the hanger directly under the center of the track. If it does not, the position must be changed slightly. It will be noticed in doing this work that the distance of the hanger center from the door itself is determined chiefly by the closed position of the doors; the distance of the hanger from the hinged joint is determined by the position which the doors are to occupy when opened. The position of the hanger must, therefore, be worked out carefully by experiment, as indicated, before it is permanently screwed to the door section.

Such a door can be fitted with a lock of the same type as the door lock, so that it can be operated with the same key as the house door. The door works entirely on the inside of the casing, so that all parts of the mechanism are protected from the weather, and still but very little room inside the garage is required.

Snow Fence for Preventing Drifts

When a wind blows over a deep snowfall, striking a bank at the bottom of

A Portable Fence, Which can be Quickly Set Up When Need for It Arises, Prevents the Snow from Drifting over the Walk

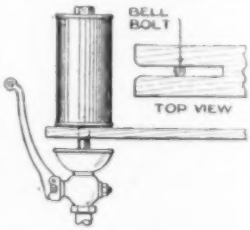
which is a sidewalk, the walk is pretty sure to be covered with a deep snowdrift, and efforts to shovel the snow off are not very successful as long as the wind keeps up. The illustration shows a portable fence, built in 8-ft. sections, each 3 ft. high, which will remedy this difficulty at the start. The fence is placed some little distance to the windward of the walk, and snow which blows over it will in most cases blow over the walk also. Snow which blows under it will not reach the walk. When the walk is at the same level as the rest of the ground, the fence should be set closer to the walk.—J. Horace Van Nice, Chicago, Illinois.

Cleaning Water Pipes with Potash

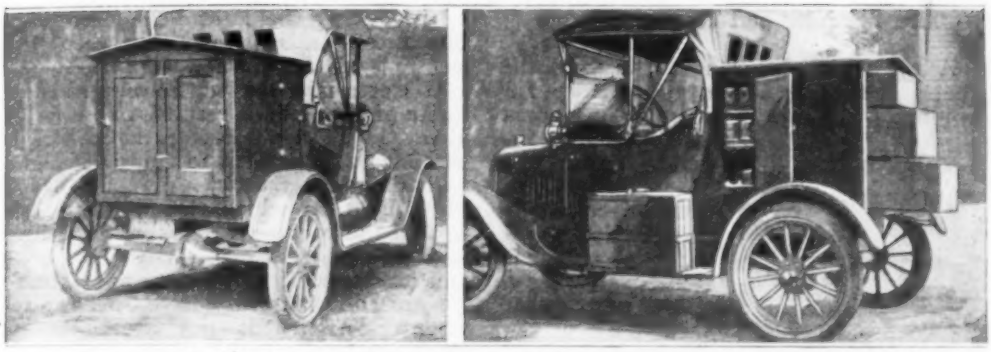
Water pipes that are partly clogged may be cleaned by flushing them with a strong solution of water and potash. To introduce this solution, shut all faucets on the same branch, turn the water off at the cut-off, put the vessel containing the solution under the faucet spout, and open the faucet. The spout must be touching the liquid. Water draining from the branch, through the drain plug, causes a vacuum in the branch, which will draw the potash solution from the vessel into the pipes, thus flushing them thoroughly. But the faucet spout must be kept under the surface of the solution until the latter is all drawn in or until the suction ceases.—Ed. Shetzen, Atlanta, Ga.

When Whistle Valve will Not Close

When the steam valve of a whistle becomes stuck, there is in some cases no method of shutting off the steam from the whistle, and it therefore continues to blow until the boiler is "killed." This happens quite frequently on a locomotive, either as the result of a broken valve or of dirt getting under the seat.



By the method shown in the sketch, the noise can be greatly deadened. A forked stick or board is slipped under the bell of the whistle, and prevents the greater portion of the steam from entering the bell. The stick can be quickly cut from a scrap of wood, with almost any wood-cutting tool which happens to be handy.—F. W. B., Sioux City, Ia.



Serving the Purpose of an Advertising Device as Well as That of Cheap Transportation, This Outfit is Used by a Salesman Traveling through Rural Districts

An Automobile Body for Salesman's Use

A Michigan salesman, whose customers were farmers living within a radius of 10 miles from his headquarters, needed a special body for his runabout, which would accommodate his stock neatly, and make it easy to display. The job was done at a cost of $23.10, and the result is shown in the photographs. The base of the cabinet is of 2 by 4-in. lumber, and is fastened by bolts to the chassis. These may be unscrewed at any time, and the body removed to make way for the regular runabout body.

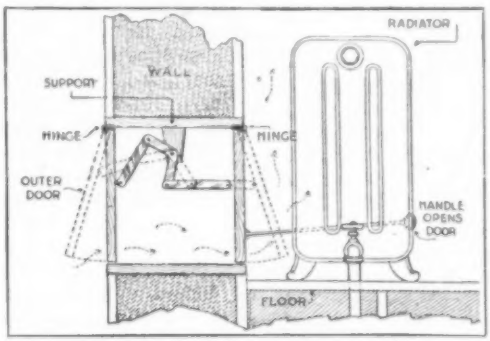
As shown in the pictures, there are three drawers on each side which pull out at the rear, and in addition there are compartments in the forward end of the cabinet, to which access is had by doors at the side. A piece of heavy oilcloth is tacked over the roof of the cabinet to render it waterproof. With this outfit, the salesman carries on a business upward of $7,000 a year.—Chester W. Shafer, Three Rivers, Mich.

Razor Blade Makes Good Scraper

A double-edged razor blade, held between two pieces of thin wood or cardboard, with the edges ground square on an oilstone, makes a very good scraper which will hold the edge. The blade may be either glued or bolted between the two pieces of wood.—A. F. B., New York City.

Ventilator Built behind Radiator

Few houses have sufficient fresh air in the winter. This condition would not be so general if adequate ventilators were provided to furnish fresh air without wasting fuel. Such a ventilator may be installed as follows: A small casing is fitted into the wall back of the lower part of the radiator. There are doors at the outside and inside of this casing, both doors opening away from the wall. The inside door is opened by pulling on a rod which runs between the sections of the radiator and ends in a loop. Between the two doors is an arrangement of iron links which has the effect of opening or closing the outer door at the same time the inner door is opened or closed. In this way any degree of ventilation desired can be obtained, within the limits of the opening of the doors. The air which comes in at the bottom of the radiator combines



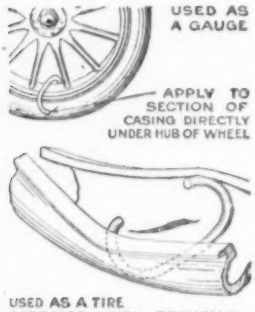
An Opening Made in the Wall, and Provided with Two Doors, Forms a Ventilator Which Insures Heating of the Incoming Air

with the upper current of air through the radiator, and does not spread out over the floor as it would do if it were brought in at some other part of the room.

¶ Raisins, currants, or small fruits, can be easily washed by placing them in a corn popper, which is then held under a faucet.

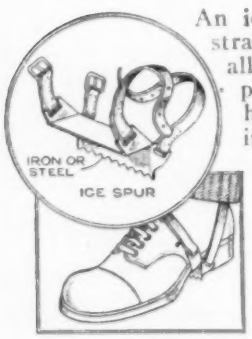
Tire Spreader and Pressure Gauge

A piece of ⅜-in. iron rod, bent to the shape shown, is a handy appliance for holding the beads of a tire casing apart while making interior repairs, or patching. In addition, if made the correct size, it will serve as an inflation-test gauge. To accomplish this, pump the tire up to the right pressure, and measure the casing directly under the wheel hub, with the weight of the car resting on the axle. The distance between the points will not, of course, be standard for all tires, but will depend on the size of the tire being measured. A gauge of this kind has perhaps no great accuracy, but is far cheaper than the dial type, and as it only applies to one size, it is less likely to be stolen. Also, it is a much simpler operation to caliper the tires than to unscrew the caps and apply the pressure gauge.



Spur for Walking on Ice

An ice spur, which is strapped to the foot, allows sharp points to protrude beneath the heel, thus preventing the foot from slipping on an icy surface. The spur is made from sheet steel, bent, sharpened, and fitted with straps, which hold it firmly to the foot.



Poultry-House Lighting

Experiments made under a variety of conditions have shown that artificial light in poultry houses is a money-maker. By prolonging the days in late fall and early winter, the hens are induced to exercise longer and consume more feed, so that they lay eggs more plentifully; and in some cases large flocks have laid as many eggs in November and December, when eggs are scarce, as in the spring months of abundant supply. Different methods of producing the light have been tried, but most authorities are agreed that electricity is best, when obtainable.

If electricity is used, 50-watt nitrogen lights give excellent results, when spaced about 15 ft. apart along the center of the house. It is well to equip the lights with dimmers, thereby producing a sort of twilight, in which the birds are able to find the roosts. In this way the light is evenly distributed about the house, and is not too bright in any one spot.

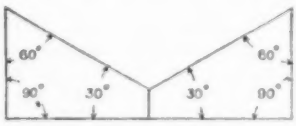
Kerosene lanterns have been used when electricity is not available, but these are hardly to be recommended. It is necessary to use several to give sufficient illumination, and there is considerable work to be done in filling and cleaning them, trimming wicks, etc. In addition, the fuel cost is higher.

The gasoline mantle light has been adopted extensively in the West. When the house is small, individual lanterns are used, or else a tube system. A four-light system, suitable for a 100-ft. house, has, until recently, cost in the neighborhood of $60 in that part of the country, which is far lower than in the case of kerosene lamps.

It must be borne in mind that the color of the walls is quite a factor, and that it pays to keep them white. When electricity is used, it is not difficult to arrange switches in such a way that the light can be turned on early in the morning without the need of a visit to the poultry house. Profits are, of course, increased by providing extra light at the beginning of the day as well as at the end, and clockwork may be used to turn on the current at the hours desired.

Triangle for Isometric Drawing

A person doing much work in isometric drawing will find the triangle shown very useful. It has two 30° angles for the two horizontal axes of the isometric drawing, and the sides are both 90°, giving the vertical axis. Its use will be found to save much time, as just what is required is there, and nothing unnecessary is in the way.—S. B. Royal, Philadelphia, Pa.



¶An old silk-glove finger placed over a curtain-rod end will protect the curtain when the rod is slipped through the hem.

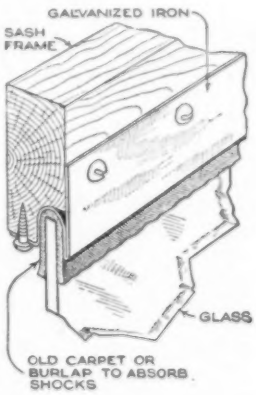
To Prevent Radiator from Freezing

Autoists are often bothered in the winter by the freezing of the cold-water pipe leading from the bottom of the radiator to the lower part of the cylinder water jacket. If this pipe is frozen, and the engine is started, the water in the upper part of the radiator will soon boil, but as heat goes up, and not down, it will boil away before thawing out the frozen pipe. There is an easy method of remedying this, in a way that is entirely automatic. When the circulation is stopped, the boiling water is soon carried off in the small overflow pipe. If the lower end of this pipe is loosened from its fastening, and moved to a point directly at the base of the cold-water pipe, the heat of the steam will thaw out that pipe while the car is in motion. As soon as it is thawed out, the circulation is resumed.

If the overflow pipe is so located that it cannot be moved, the autoist should carry a section of rubber tube to slip over the end of the pipe, and so direct steam to any cold part of the radiator he desires. The steam flow will cease as soon as circulation of the water through the piping is resumed.

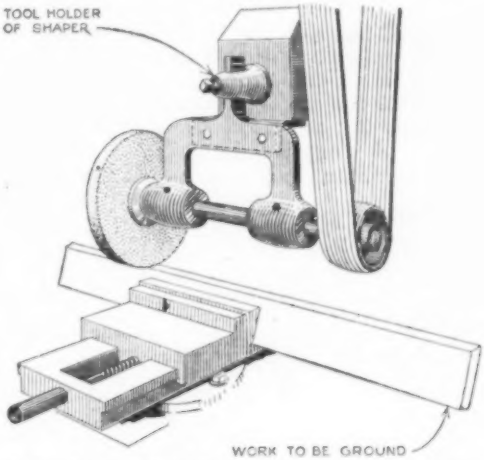
Cushion Mounting for Window Panes

In cellar windows, where the glass panes frequently become broken, the method of holding the glass illustrated in the drawing may perhaps remedy the difficulty. Strips of sheet iron, preferably galvanized, are cut to the lengths of the four sides of the sash, and are formed to the shape indicated. The rabbet which receives the glass in the sash must be enlarged to take the iron strips. Some strips of burlap, or old carpet, are cut to fit around the edges of the glass, which is then mounted as shown. It will, of course, be necessary to fasten only one of the four iron strips at first, then place the carpet strips and sheet iron in position on the other edges of the glass before fastening these in position.



Fixture Changes Shaper to Grinder

Desiring to sharpen some sheet-metal dies and shear blades one day, and having no machine for the purpose, our machinist rigged up a device which proved so satisfactory that it is now listed as one of the permanent fixtures in the shop.



A Small but Solidly Built Fixture Converts a Shaper into a Surface Grinder When Required

A small arbor, carrying a ½ by 6-in. emery wheel and a pulley, was mounted in a bracket made as shown in the sketch, and the end of the bracket was secured in the tool post of a shaper. A countershaft was hung about 10 ft. overhead, with the driving pulley directly over the arbor pulley when the latter was at the center of the shaper stroke. A 3-in. belt was used, the slack in the belt allowing enough play for the movement of the shaper.

A die, or shear blade, could then be clamped to the table, and after setting the grinder to the proper height and stroke, it would be sharpened accurately with very little attention from the machinist. On long shear blades, of course, the blade would have to be moved along to a new position in the vise, as the table reached the end of its travel.—C. M. Vaiden, Edgewood, Md.

¶ To test manila rope, first free it from oil, then soak for 20 seconds in bleaching powder acidulated with acetic acid, rinse in water and alcohol, and expose for a minute to the fumes of ammonia. Manila fiber turns russet-brown, while all other kinds of rope turn cherry-red.

A Water-Power Dishwashing Machine

By F. D. BURKE

THE dishwashing machine here described can be built almost entirely in the home workshop, without the use of machine tools. If carefully constructed, it will do the same work as machines selling for five or six times as much as this one will cost to build. The material used is easily obtained and worked; it need not cost over $10. The power is supplied by a compact little water motor, built into the machine.

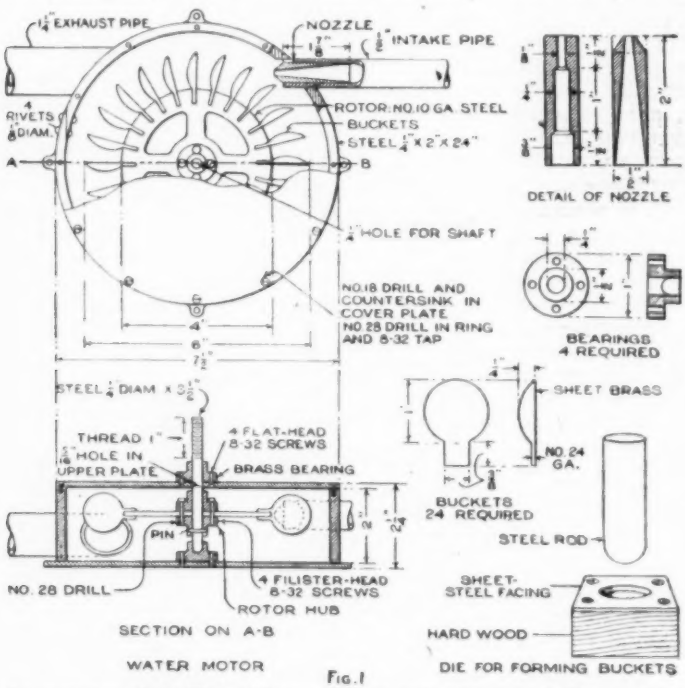


Fig. 1

Construction of the Water Motor: Water under Pressure is Thrown by a Nozzle against Blades on the Wheel, Causing the Shaft to Revolve Rapidly. Blades, Bearings, and the Nozzle are Shown in Detail with Dimensions

The design of the motor is adapted to allow it to work on water pressure as low as 40 lb. The construction of this motor, which entails the largest amount of labor, will be described first.

Motor Casing

A piece of ¼-in. steel is first bent to form the large ring which constitutes the cylindrical wall of the motor. The two ends are filed and brought together, as shown in Fig. 1, and are fastened together by four rivets. After riveting, the joint should be soldered to make sure it is water-tight.

Next, the holes for the intake and exhaust pipes are located and drilled. The exhaust pipe must be larger than the intake pipe, as indicated, and must be set close to the lower side of the casing, to insure the easy flow of the water. Both pipes should make a drive fit in the frame. The length of the pipes will be governed by the diameter of the tank used, as explained below.

The two cover plates can be roughed out with a hacksaw, and finished with a file. They are then set in position on the heavy ring, and the 12 small holes for the screws, which hold the casing together, are located, drilled, and tapped, according to the dimensions given in the drawing. Only the bottom plate is provided with the four projections, or lugs, shown in the figure. These lugs are used to fasten the motor to the bottom of the tank.

Bearings

The bearings are turned from 1-in. brass rod, to the dimensions given in the detail. Four such pieces should be made, three of them with the center hole clear through, and one with the center hole blind, ending in a round bottom, as shown by the curved line in the detail. One of the three pieces is used as the upper bearing, while the other two form the rotor hub, as described below. The bearings are alined in the following manner: Mount the lower bearing in the exact center of the bottom plate. Screw both plates to the heavy ring. The propeller shaft is pushed through the hole in the center of the top plate, and into the lower bearing. The upper bearing is then placed on the shaft, and pushed against the top cover. Since the hole in this top cover is drilled oversize, the shaft can be moved around slightly until a position is found where the upper bearing can rest tightly against the cover plate without grinding on the shaft. In this position the bearing should be fastened; mark the positions for the four holes on the cover plate, remove this from the other parts, and drill the holes.

Construction of Rotor

The rotor consists of 24 small blades, or buckets, mounted in slots cut in a steel disk. These slots are, of course, spaced equidistantly around the disk. They can be cut out to the dimensions shown in the detail, with hacksaw and file. Large holes may be made in the disk to lighten it, as illustrated, and a hole is made exactly in its center to take the shaft. The hub consists of two pieces of brass, identical with the brass bearing on the upper side of the casing. The shaft should be forced through the hole in the disk; the hub pieces are then slipped over the shaft, and fastened in position with screws, as shown.

The buckets are of sheet brass, and should be laid out by means of a pattern, cut to the dimensions given in the detail. The cup shape may be given them by driving the circular part into a simple die by means of a steel rod, shaped to form a round punch. The punch may be driven into the die with a heavy hammer, or pressure may be applied by means of a vise. The finished buckets are set in the slots in the motor disk, as shown, and soldered.

Nozzle

The construction of the nozzle is clearly shown at the upper right in Fig. 1. Holes are first drilled in it with three different sizes of drill. The bore is then finished to a smooth taper by reaming; if a taper reamer is not available, a worn-out round file can be ground to the proper shape for this purpose. The nozzle should make a drive fit in the intake pipe. It should be forced in, and the projecting end finished off with a file.

Final Assembly of Motor

In the final assembling, care should be taken to adjust the nozzle and rotor so that the stream of water from the nozzle will strike the exact center of the buckets. The rotor is then fastened to the shaft with a small steel pin, as shown in the sectional view. The intake and exhaust pipes should be well soldered in the frame. Heavy paper gaskets, well shellacked, should be placed between the cover plates and frame, to insure water-tight joints.

Fan Construction

Figure 2 shows in detail the construction of the fan, which drives the hot water against the dishes to be washed. The hub plate is mounted on the propeller shaft between two nuts. The plates are set at an angle of about 10° to the hub plate, and should be slightly curved to give best results. They are

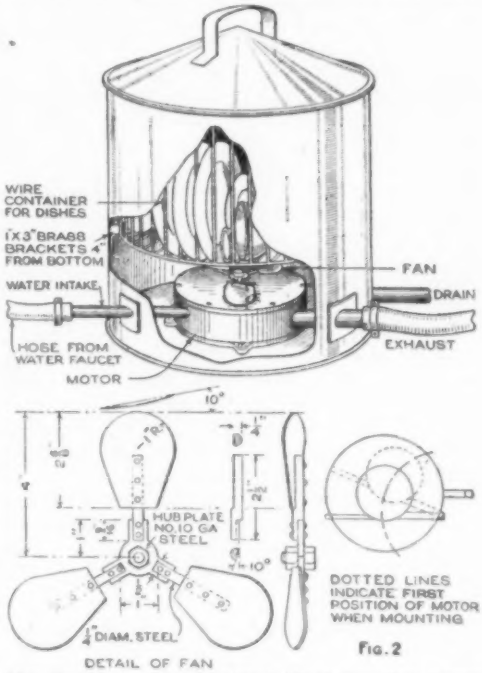


Fig. 2

The Fan and the Completed Machine: Hot Soapy Water is Thrown in a Fine Spray against All Parts of the Dishes, Cleaning Them Thoroughly

riveted to the steel arms, which are, in turn, riveted to the hub. After the fan is completed, it should be trued up by bending the plates, so that they follow each other in a perfect circle, and have the same shape.

Tank

The tank, or container, should be of heavy-gauge tin, 16 to 18 in. in diameter, and about the same depth. It should be fitted with a water-tight cover. Such a container can be purchased wherever cooking utensils are sold. The dishes are placed in a wire cage, which is supported on four brackets, made from sheet steel. These are riveted and soldered to the inside tank. For draining purposes, a short length of brass or copper tubing is soldered into the side of the tank, quite close to the bottom. This pipe should be fitted with a cork or wooden plug.

Assembly of Complete Machine

The complete machine is shown in the upper drawing of Fig. 2. The motor is first put in, so that the projecting intake and exhaust pipes are on a line

with the greatest diameter of the tank. The exhaust pipe is pushed through the hole cut in the side of the tank, next to the drain pipe. The motor can then be moved until the intake pipe lines up with the hole cut for it. When the motor is moved to its final position in the center of the tank, both pipes should project at least 1 in. from the sides of the tank. Four copper rivets are used to fasten the motor to the bottom of the tank. These rivets are inserted from the underside, and the heads should be well soldered. Two small squares of heavy-gauge tin are fitted over the intake and exhaust pipes, and soldered to the outside of the tank, as shown in the figure. All parts of the machine which are made of steel should be heavily nickelplated before the final assembly. Any of the steel parts can be made of brass, if made somewhat heavier, but even with brass, it is desirable to plate the parts well with nickel.

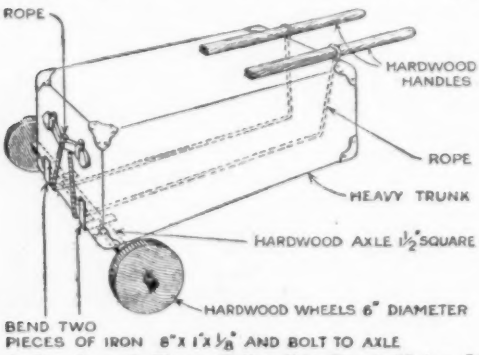
A short length of rubber hose is fitted to the exhaust pipe. A longer piece of hose is fitted to the intake pipe. The free end of this piece should have a suitable connection for attaching to the cold-water faucet.

Operation of Machine

The machine should be conveniently located on a shelf or stand next to the kitchen sink. The hose leading to the intake pipe should be connected with the cold-water faucet; the exhaust should be arranged to flow into the sink. The tank is half filled with hot water, to which is added a small quantity of soap powder. The dishes are stacked on edge in the wire basket. The silverware may be placed in a small container in the center. The full basket is then placed in the tank, the cover put on, and the motor started. The swiftly revolving fan throws the soapy water up through the dishes with a whirling motion, and thoroughly cleanses them. After running five or six minutes, the tank is drained, and refilled with clear hot water. It need only be run a minute or two for rinsing. The tank is again drained, and the motor started a third time, the propeller acting as a fan, and throwing a blast of warm air up among the dishes, which dries them.

Compact Truck for Trunk Moving

The illustration shows a very simple and cheap truck for moving a trunk over smooth floors or ground. The truck consists merely of two stout hardwood handles, an axle with two wooden wheels, and the rope connection. The axle is provided with iron angle pieces to keep the trunk from slipping forward; these should extend back far enough to keep the axle from revolving, and thus letting the trunk slide forward. The length



A Simple and Cheap Collapsible Truck Makes It Easy to Move a Trunk over Smooth Floors or Ground

of the rope depends of course on the size of the trunk to be hauled, and the rope must, therefore, be tied again about one of the handles each time the device is adjusted to a new size of trunk. The great virtue of this arrangement, besides its simplicity and low cost, is the fact that it can be packed into small space.

Whisky Barrel as Barrow Wheel

On sandy soil or rough ground, where an ordinary wheelbarrow is of little use, a barrow furnished with a light wooden roller instead of a wheel can give good service. An excellent roller for the purpose can be made out of a discarded whisky barrel, and many of these have lately gone into the discard. The barrow frame will be rather different from those usually seen, as the two arms at the front which carry the axle bearings must be far enough apart to admit the barrel. A barrow of this kind was used to haul driftwood out of the dry bed of a stream, and was pushed without difficulty over rough surfaces and very soft ground. In places where the watercourse was flooded, it was found that the empty barrel was buoyant enough to float the barrow, even when heavily loaded.

¶ Good chicken troughs can be made by splitting worn-out wooden pump tubes, and closing the ends and the spout hole.

Light Removes Particles from Eye

Small foreign bodies which are not imbedded in the eyeball may often be removed by going into a dark room, looking up toward the lighting fixture, then turning the light on quickly. If the light is strong enough, it will cause a violent reaction which will cause the particle to be washed to the corner of the eye. It is then easily removed by means of a clean handkerchief.—Frederick C. Davis, St. Joseph, Mo.

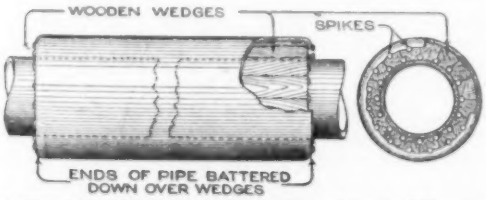
Fire-Bucket Sign Prevents Misuse

Fire buckets are usually hung high to prevent use except in case of fire. By making a float of cork, and attaching a small cardboard sign, reading "O. K.," to the upper part of the cork, a workman will readily see whether the bucket needs replenishing or not, and will be still less likely to use the bucket for any purpose for which it is not intended.—J. H. Moore, Toronto, Can.

Repair for High-Pressure Pipe

A rough-and-ready splice for large pipes, which requires no special fittings and can be applied in an emergency, is shown in the illustration. A piece of pipe, 1 or 2 in. larger than that to be spliced, is slipped over the mains, and is centered over the break. Wooden wedges are driven in all around at both ends, being spaced so that the sleeve is held at a uniform distance from the main at all points. When the wedges are all tight, the ends of the sleeve are battered down all around, so as to overhang the wedges and hold them in. Finally spikes are driven into the wood as shown, to tighten up the wedges.

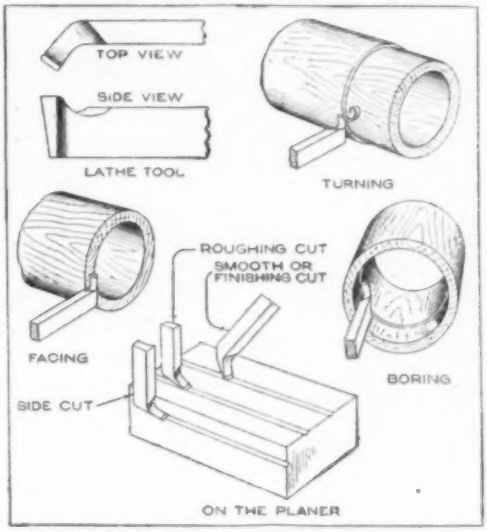
Besides stopping the break, this type of joint also acts as a compensating link for offsetting the effect of expansion and contraction in the main, thereby preventing further breaks.



A Pipe Splice That can be Made from Scraps of Heavy Pipe and Wood, Is an Interesting Expedient in Emergencies

A Multiple-Purpose Lathe Tool

The job worker who gets tired of having to keep a large number of tools in condition in order to be ready to handle an occasional lathe job, will find the tool illustrated a very interesting one. With it he can handle a wide range of work, especially if both right and left-hand tools of this type are provided.



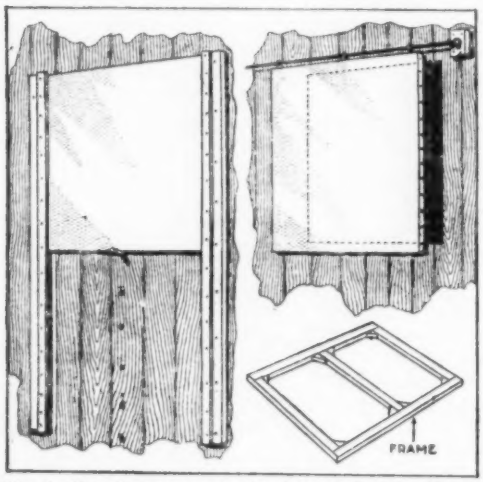
A Few Tools Forged and Ground to the Shape Indicated, will Take the Place of a Number of Special-Shaped Tools

The tool is shaped as shown at the upper left in the picture; it is quite important that the corners be beveled off slightly, so that a smooth surface will be left on the work, even when taking roughing cuts. The large variety of operations in which it can be used is suggested in the other views. The tool is very rigid, so that heavy cuts can be successfully taken; it is economical, as it eliminates the necessity of having several other tools; it is not at all difficult to forge, and when it has been worn down by repeated grindings, it is easily dressed. Many tools, on the contrary, are of such shape that, when worn out, it is impossible to dress them without cutting off and wasting considerable steel. Not the least of the advantages of this type is its long life, as both corners are used, one for turning and the other for boring.

The angle of the cutting edge, as illustrated, is right for low-carbon steel and cast iron; for working wood and brass, the angle will have to conform to the usual practice in cutting those materials. —M. L. Lowrey, Livermore, Calif.

Poultry-House Ventilation

Poultry raisers have come to realize that the ventilation of the poultry house is a very important matter. There must



Muslin Ventilators can be Used in the Poultry House to Secure Abundance of Air without Either Drafts or Extremes of Temperature

be an abundance of fresh air without extreme heat or cold, and without dampness and drafts. Proper conditions cannot be had with the makeshift, wrongly used ventilators frequently employed.

One method, which has proven successful, is to use the straw air strainer. A second ceiling is built, about 6 in. below the regular ceiling, in the form of a latticed framework. A trapdoor in the center of this makes it possible to change the straw which is packed between the lattice and the original ceiling. Vents, or wide, low openings, must be cut in the sides of the house as close under the eaves as possible. The air, entering at these vents, filters through the straw, and thus into the poultry house. No drafts are possible, and the temperature is kept very nearly constant. The straw also absorbs a great deal of moisture.

Another method, in rather wide use, is to cover an ordinary window frame with muslin, instead of using glass. An improvement on this type of ventilator is shown at the right in the drawing. A light wooden frame covered with muslin is hung from a wire, which serves as a track. The frame can thus be moved sideways, over or away from the window opening. Screw eyes on the frame allow it to slide easily over the wire. The wire itself may be fastened either to screw eyes or over blocks at either end. To the left is shown a similar frame, moving up and down. In this case it will be necessary to arrange some means of holding the frame at the height desired. Either pegs that fit into holes in the wall, or a hook fitting into screw eyes, placed at various heights in the wall, may be used for this purpose.

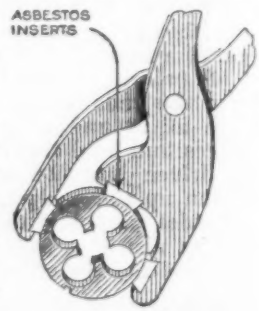
The advantage of the air strainers over muslin-covered frames is that the latter have to be adjusted accurately to the weather, while the air strainer requires no attention whatever.—J. T. Bartlett, Ft. Collins, Colo.

Hauling Christmas Trees

Christmas trees, which are dragged in on a sled over the snow, are often so badly injured on one side that this side has to be placed against a wall when the trees are set up. As it is usually preferred to set the tree in the middle of the room, the breaking off of branches should be avoided. This can be done, if the tree is placed on the sled with simple trusses on which the main trunk of the tree rests directly, thus taking the weight from the branches.

Tongs for Hardening Round Dies

In hardening round threading dies, they are often found to spring out of shape, or to crack across the narrow portions of the steel. This can be avoided by the use of a special pair of tongs made like the sketch, and as here described:



The dies are made in the usual way, and the opening for adjustment is cut only partly through. The tongs have asbestos inserts, spaced to grip the die on the thin parts, as shown. Held in the tongs, the die is placed in the fire, and heated to a cherry red, then quenched in oil or water. The asbestos inserts retard the cooling process on the thin parts, leaving them with the desired spring temper, and preventing cracking. The die is next drawn to temper in hot oil or on a plate, as usual, and when cold the remainder of the slot is cut through with a thin grinding wheel.—Violet Johnson, Rockford, Ill.

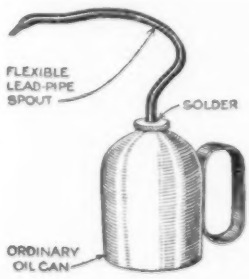
Antique Mahogany Furniture

Unfinished mahogany furniture can be given the appearance of old mahogany by applying bichromate of potash dissolved in water. The shade is regulated by the strength of the solution, or by varying the number of coats applied. The surface of the wood tends to become rough when the solution touches it, owing to the presence of water in the mixture, but it can be restored by using sandpaper after each coat of the solution has thoroughly dried. This is an excellent method of staining inlaid mahogany, as the solution has hardly any effect upon the wood used for the inlay. When other methods are employed, it is generally necessary to protect the inlay with shellac, or to prevent the stain from passing beyond the edges of the inlaid portion, which will otherwise assume the same color as the rest of the wood. A light, soft brush is necessary in the latter case.

This method of staining can save the amateur cabinetmaker a good deal of trouble, when repairing mahogany furniture, if he has difficulty in matching the original piece. He can give the surface uniformity by using wood of a fairly light color, and deepening the shade with repeated applications of the same solution. —Chas. A. King, East Kingston, N. H.

Oilcan with Flexible Spout

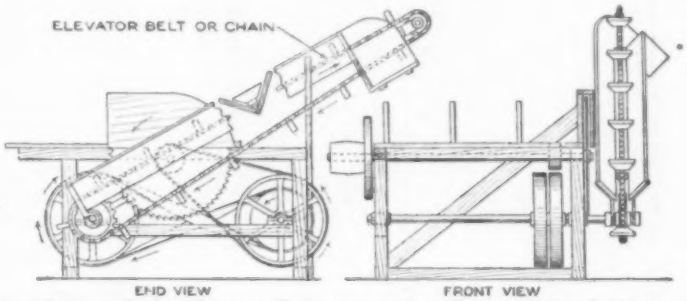
An oil feeder with a flexible spout can be made at very slight expense by soldering one end of a narrow piece of lead pipe to the screw top of a small oil container, and beating the other end to a taper point, leaving a hole just large enough for the oil to escape. Or a spout can be taken from a small feeder and fastened to the pipe, making the hammering process unnecessary. The lead pipe can be bent to almost any angle, and will be found a great convenience in reaching awkward places.



Elevator for Portable Saw Frame

By the use of an elevator like that shown in the accompanying drawings, the labor of one man is saved.

As soon as a length of wood has been cut off, it drops directly into the chute, whence the chain carries it to the upper end, discharging it upon a short incline, from which it drops to the pile. A considerable pile of wood may thus be cut before moving the outfit ahead to a new position.



An Endless-Chain Elevator, Built onto a Saw Frame, Makes It Unnecessary to Have a Man to Take the Pieces of Wood as They are Cut, and Throw Them to the Pile

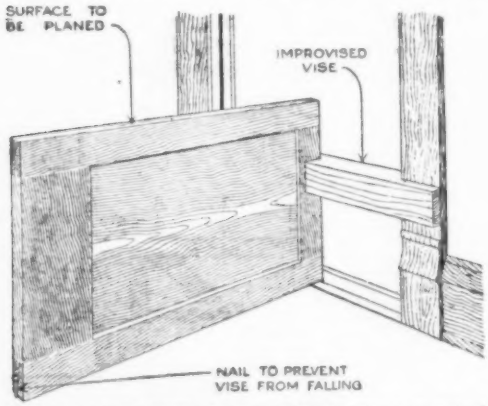
The elevator consists mainly of a V-shaped chute, at the end of the saw bench and running up beside the saw. Through it runs a chain belt, driven by a small sprocket on a countershaft, which in turn is driven from the mandrel by means of other sprockets and a chain, as shown. To the elevator belt are attached, at suitable intervals, wood blocks made to fit the inside of the chute. The elevator is held in place at the lower end by two hooks formed of malleable iron engaging the countershaft, one on either side of the sprocket, and at the upper end by a long wooden piece, or other suitable support. Of course, hard and fast rules for constructing one of these elevators cannot be followed in every case, due to wide variation in the construction of cut-off saws, but the man handy with tools will find little difficulty in adapting this convenience to any particular frame.

With the wood to be cut piled horizontally, one man can operate such an outfit alone if desired, and make very satisfactory progress.—Arthur J. Dunckel, Dolgeville, N. Y.

¶ Flowers may be preserved by dipping quickly in molten paraffin. Leaves must be coated with green wax. White or light-colored flowers take this treatment best.

Handy Vise for Planing Doors

Carpenters are often called upon to do odd jobs such as planing doors that have



The Door is Held Upright for Planing by a Notched Piece of Board Which Fits against the Door Casing

swelled. Usually the task is made more or less difficult by the absence of vise or workbench. A simple vise can be quickly made by cutting a notch in the center of a scrap piece of 2 by 4-in. lumber, then notching the ends to fit in the door casing. The door is taken from its hinges, and placed against the 2 by 4-in. piece, with the end of the door fitted into the notch cut. A nail driven into the floor at the other end of the door holds the door tight against the vise and prevents it from falling.—H. K. Capps, Stahl, Missouri.

Notches Help Lathe Dog to Hold

Work held in a lathe dog often slips around when a heavy cut is taken off the stock. Notches filed into one side of the dog will usually prevent the recurrence of this trouble.

Sandpaper Holds Whetstone

Place a piece of sandpaper, sanded side down, under the whetstone, on the top of the workbench. Turn the edges of the paper up a trifle, and the stone will not slip, because it is held to the paper by suction as soon as pressure is applied on the stone, and the paper is kept from slipping on the bench by its rough surface. Also, the paper will catch the oily discharge and thus keep the bench clean.

"Don'ts" for the Furnace

Don't shake live coals into the ash pit.

Don't let ashes collect under the grates.

Don't shake down the ashes too much in mild weather.

Don't forget to shake them down thoroughly in cold weather.

Don't forget that the fire needs air in order to burn.

Don't admit so much air that it becomes chilled.

Don't let too much air in above the fire; it needs very little.

Don't let partly burned gas escape from the fire, owing to a lack of air to burn it.

Don't believe any manufacturer who says his furnace will burn air. It won't.

Don't disturb the fire any oftener than necessary, especially with hard coal.

Don't use twice as much coal as necessary, merely because you haven't studied your furnace.

Don't let clinkers collect in the fire; every few days run a poker through it, find the clinkers, and remove them.

Don't let clinkers stick to the grates or the sides of the fire pot, or the iron may become burned.

Don't fire the furnace too often; give it plenty of coal three times a day, and leave the fire alone in the meantime.

Don't let the fire become thin in order to save coal. Let the fire come even with the bottom of the fire door, and if the weather is mild, use the dampers.

Don't leave the damper in the fire door open more than 20 or 30 minutes after hard coal is placed on the fire—45 minutes for soft coal.

Don't forget to use the ash-pit damper and the chimney damper in conjunction with each other. When opening one damper, close the other. Both control the admission of air to the furnace.

Don't neglect to attend to the fire carefully at night. About half an hour before the fire is to be checked for the night, remove the ashes thoroughly from the fire, and from the ash pit. Put enough coal on the fire to cover it completely, and shut off the dampers.

Don't move the dampers oftener than necessary.

Don't worry about the furnace.

¶ When a large hole is to be bored quite accurately with an expansive bit, first make a hole at the center just slightly smaller than the feed screw on the end of the expansive bit. Then proceed with the large bit, taking a fine cut.

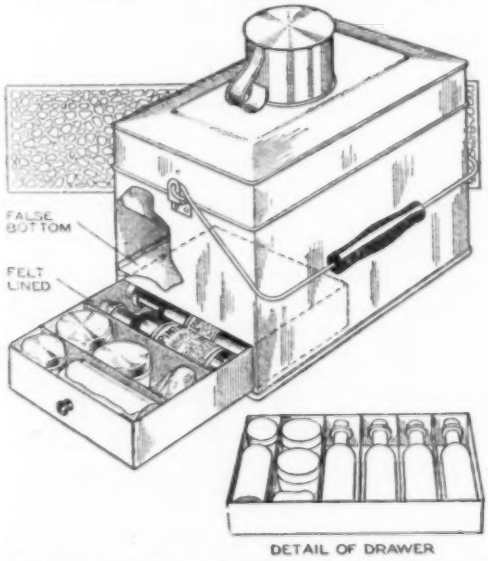
First-Aid Kits for the Mechanic

Every mechanic is likely at some time or other to be the victim of an accident which makes necessary the use of antiseptics, pain allayers, or dressings. It may be that he only "barks a little skin off his finger," but if uncared for this may prove serious.

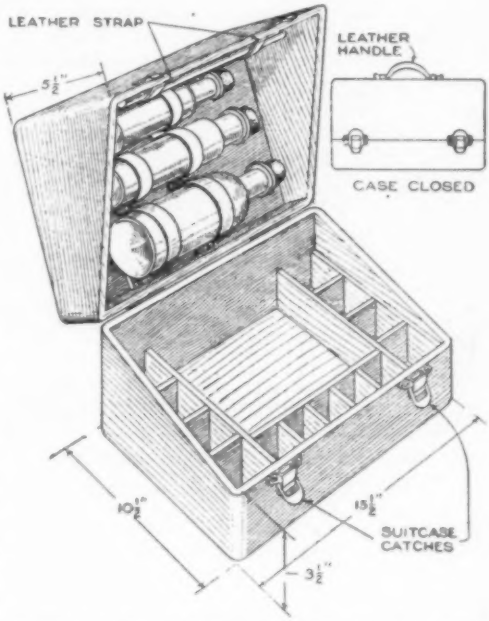
The two types of first-aid kits shown in the drawings were designed to meet the needs of both the shop worker and the mechanic employed on outside jobs. An addition to the ordinary dinner pail provides the mechanic with the necessary articles, wherever he may be working, while the more pretentious outfit is especially valuable in the shop, where many minor cases require attention each day.

A tin false bottom, soldered about 1½ in. above the regular bottom of a dinner pail, provides room for a sliding drawer, also made of tin. The metal between the two bottoms must be cut out at one end, to provide for the insertion of the drawer. Several divisions in the drawer hold the various articles separate, always just where they can be grasped quickly, and protected from either breakage or contamination. Further protection is secured by lining the drawer with heavy felt.

The contents of such a kit should include the following: Adhesive tape, gauze bandage, aseptic cotton, petroleum jelly or vaseline, powdered alum or bicarbonate of soda for acid burns; bottles of turpentine, peroxide, iodine, and oil for burns, and other articles to suit the mechanic, such as scissors and finger cots.



The Mechanic Working Away from the Shop may Carry His Own First-Aid Supplies in the Bottom of His Dinner Pail



A Wooden Case Provides a Portable, Yet Completely Equipped First-Aid Kit for the Machine Shop

For shop use a larger and more complete equipment is desirable. This may be handled quickly and effectively if stored in a wooden case such as shown in the drawing. In the lower half of the case are compartments for the various articles, while straps looped in the upper half of the case hold the bottles and the brush, which are useful parts of the equipment.

The contents of this kit should include the following: Arnica, carbolic acid, peroxide, green soap, cholera mixture, aromatic spirits of ammonia, essence of peppermint, iodine and brush to apply it with, vaseline, adhesive plaster, absorbent cotton, several widths of gauze bandage, medicine glass and spoon, scissors, tourniquet, and one of the many good first-aid books.

¶The tick of a watch placed on a table top may be deadened by placing an inverted glass tumbler over it, so that it may readily be seen but not heard.

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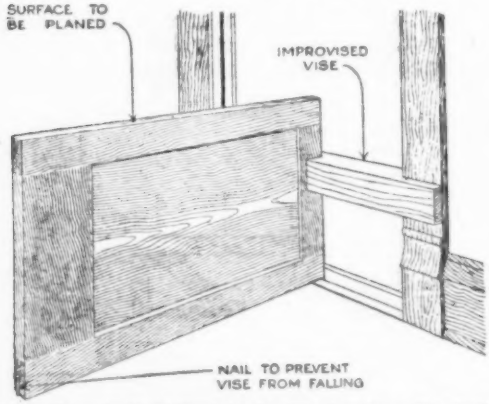

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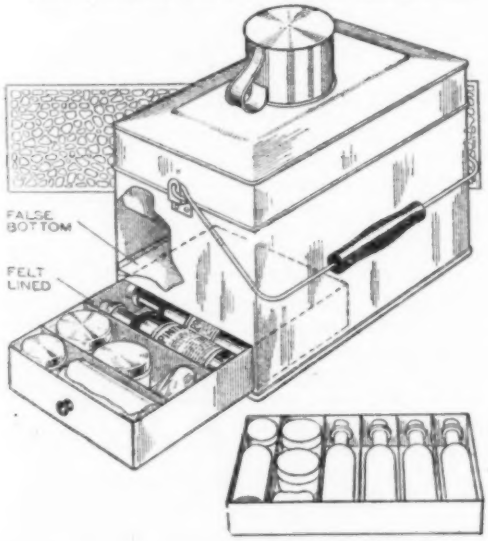

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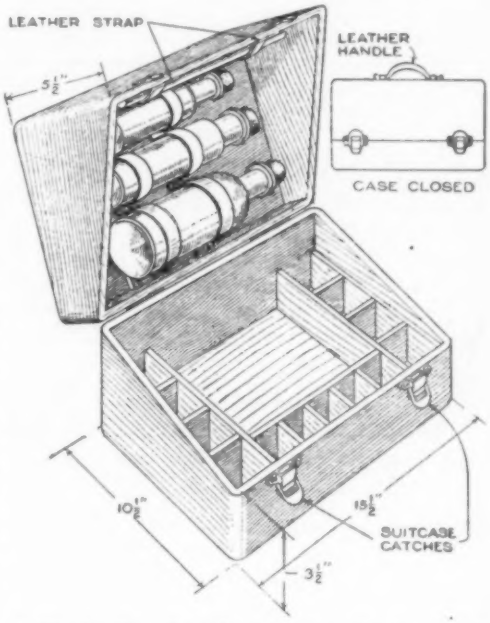


A Wooden Case Provides a Portable, Yet Completely Equipped First-Aid Kit for the Machine Shop

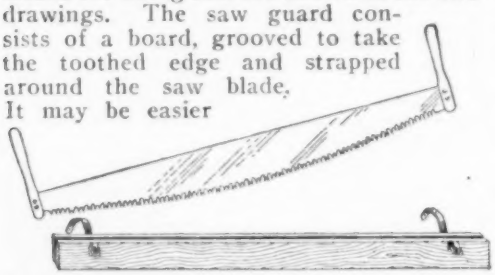
For shop use a larger and more complete equipment is desirable. This may be handled quickly and effectively if stored in a wooden case such as shown in the drawing. In the lower half of the case are compartments for the various articles, while straps looped in the upper half of the case hold the bottles and the brush, which are useful parts of the equipment.

The contents of this kit should include the following: Arnica, carbolic acid, peroxide, green soap, cholera mixture, aromatic spirits of ammonia, essence of peppermint, iodine and brush to apply it with, vaseline, adhesive plaster, absorbent cotton, several widths of gauze bandage, medicine glass and spoon, scissors, tourniquet, and one of the many good first-aid books.

¶The tick of a watch placed on a table top may be deadened by placing an inverted glass tumbler over it, so that it may readily be seen but not heard.

Guards Protect the Saw and Ax

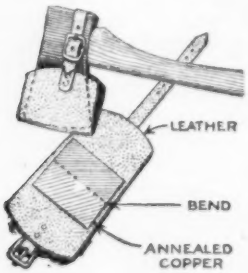
In carrying a long crosscut saw, or even an ax, a long distance, there is always some danger of accident, especially if the person carrying it stumbles or comes in contact with branches of trees. In the interest of safety, it is therefore desirable to cover the sharp edges, and means for doing this are shown in the two drawings. The saw guard consists of a board, grooved to take the toothed edge and strapped around the saw blade. It may be easier



A Saw Guard of This Type Not Only Makes Carrying Safer, but Eliminates the Springing of the Blade Which Makes a Saw Hard to Carry

to make the guard of two boards, beveled with a plane and nailed together, but in this case care must be taken that the saw teeth do not cut their way through and come in contact with the nails. Besides making for safety, this guard makes the saw easier to carry, as the board stiffens the blade and does away with the springy motion usually so troublesome.

The ax guard is made of a piece of leather taken from an old shoe or some other piece of stiff, heavy leather. To avoid cutting the leather, it is well to mount a sheet of very soft copper at the place where the edge would otherwise come in contact with the leather. The guard is strapped over the blade in the same manner as the saw guard.

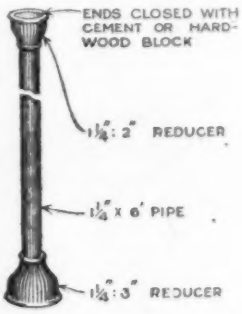


How to Make Printers' Rollers

Wishing to reduce operating expenses, a printer adopted the practice of re-covering his rollers in his own shop, instead of sending them out. As the rollers were small, he used the metal tube of a bicycle pump as a mold, and mixed the compound himself. The operation is not difficult, but a little experimenting with the compound is necessary before the proper resiliency is attained. To make the compound, add ¼ pt. of glycerin and ½ pt. of table sirup to 1 lb. of shell glue. Put the vessel containing the ingredients into a metal pot with water in it, and boil on a very slow fire, stirring constantly, so that they will be thoroughly mixed. When the right consistency is reached, the mixture will congeal quickly around a stick thrust into it, after taking it off the fire a moment. Before it is ready for use prepare for the molding operation. If a bicycle pump tube is to be used, thrust one of the ends into a large potato, so as to make an impression ¼ in. deep. In the center of the impression make a still deeper one, by thrusting in the end of the roller core as far as the shoulder. Oil the inside of the tube thoroughly, and set it in a vertical position on the impression in the potato, with the core running upward through the center. Another potato is held in readiness, to be used as a cover on the upper end of the tube, with impressions of the tube and core corresponding to those in the potato at the lower end. Pour in the compound, filling the tube to the top; place the cover in position, to keep the core in the center, and let the mixture stand until it is completely hardened, which will take five hours, or a little more. Take off the potatoes, and push the roller out of the tube by means of the core.

Post Tamper of Pipe Fittings

A durable post tamper is made from a 6-ft. piece of 1¼-in. pipe, fitted at each end with reducing couplings, which are closed with cement, or a block of hard wood driven in tightly. One end is made 3 in. and the other 2 in. in diameter, to adapt it to varying conditions. A tamper made in this way is convenient in size and weight, and is also very effective for the purpose for which it is intended.



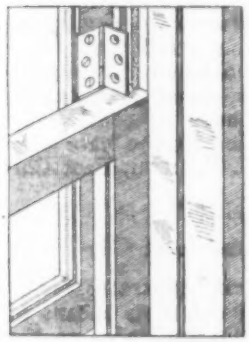
¶The stopper of a glue bottle may be prevented from sticking by rubbing a little lard on it before the glue has touched it.

Removing Scale from Steel Tubing

The process of welding develops a heavy scale on steel or iron, which is easily removed by sandblasting, chipping, or pickling the welded article. But if steel tubing is welded, the scale formed inside of it is hard to reach; only reaming will properly do the job, and this usually spoils the reamer.

A good way to get the scale out is to heat the tube to a black heat, and then plunge it in cold water. The sudden contraction of the metal loosens the oxide scale, which can then be easily scraped out with a round file.

Butt Hinge as Window Stop



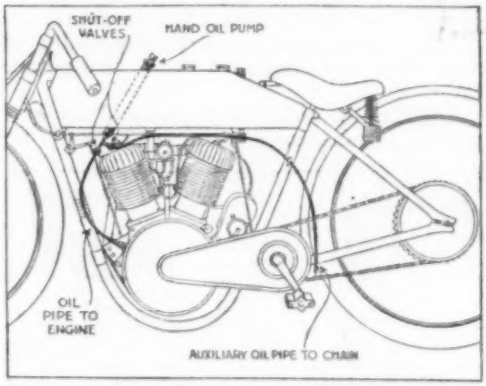
A simple window stop which locks both sash is made by setting a butt hinge flush into the upper sash. When the hinge is open, as shown, neither sash may be opened past the hinge, thus keeping out burglars or other intruders.

Typewriter Cleaned by Compressed Air

Cleaning a typewriter with a brush or cloth is a long and tedious operation, and the job is hardly ever done thoroughly, as there are many parts of the mechanism which are very difficult to reach. With compressed air the work can be done in a short time, and a moderately strong blast will remove the smallest particles, so that a very complete cleansing will be accomplished. Automobile garages are now so numerous that nearly every one has access to compressed air, and it is worth while to take the typewriter to the garage whenever the mechanism becomes clogged with dust and fragments of eraser.—Paul L. Fetherston, Milton, Wis.

Motorcycle Drive Chains Oiled While Running

If no provision is made for oiling the drive chains of motorcycles, the result is that, before the end of a long trip is reached, the chain becomes dry, thus wearing the rollers, connecting pins, and sprockets. The drawing shows a way of oiling the chain while on the road. It

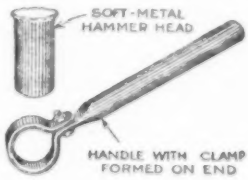


Motorcycle Drive Chains may be Greased by Introducing an Oil-Pipe Line from the Pump Used to Inject Lubricant into the Motor Base

saves much trouble and requires little attention. Most motorcycles are provided with hand pumps for injecting oil into the motor base. A Y-pipe connection inserted in the pipe which leads from the oil pump to the motor base is fitted with shut-off valves in each branch. From one of these a pipe conveys the oil to the motor base, as originally. The other pipe leads to a point just over the lower stretch of the long drive chain. With this arrangement, it is easy to oil the chain by opening the valve in the pipe leading to the chain, closing the valve leading to the motor base, and giving the pump handle several strokes. Such a change in the oiling system will prove a great convenience and may in the end save considerable expense.—John E. Hogg, Alhambra, Calif.

Handle for Soft-Metal Hammer

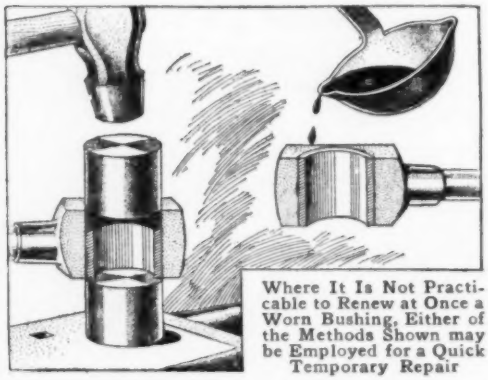
A scrap of steel tubing will provide material for the handle of a soft-metal hammer to be used for driving in taper-shank drills, and for similar purposes. One end of the tube is flattened, bent around, as shown, and fastened with a small bolt or machine screw. The hammer head, of lead or babbitt, can be molded in a hole drilled in a wooden block with an expansive bit. When the head has been too much battered to be of further use, it can be easily removed and remolded.



Removing Play in Bushings

The renewal of each bushing in the jointed connections of an automobile involves considerable work, especially if any sizes are required that necessitate lathe work.

Bronze bushings will respond to end pressure sufficiently to close the bore, or



Where It Is Not Practicable to Renew at Once a Worn Bushing, Either of the Methods Shown may be Employed for a Quick Temporary Repair

central hole, and for this reason a punch can be used to advantage to secure a neat fit around the pivot, or wrist pin, free from lost motion.

Place the bushed member in a vertical position on a circular piece, the diameter of which corresponds to the outer diameter of the bushing, and on the upper side place a similar piece. Rest these on a solid support, as an anvil, and drive with a substantial hammer. This is continued until the bushing closes up the desired amount, over the full length of the bearing. Ream out the excess at the extreme ends, with a reamer of the correct size. Wrist-pin bearings, gear bushings, steering-pivot connections, and almost any bronze bushing will respond to this treatment.

The treatment of bushings by cleaning the center with acid and pouring molten solder into them, is also a simple means of accomplishing a snug fit in the minimum of time. The bulk of the solder is allowed to blow out before hardening, leaving only a thin film. The inner surface of the bushing is trimmed to remove the excess, and the pivot or bolt is driven through. This method is not permanent, and the process must be repeated occasionally to keep the pivot tight. Do not attempt this at the wrist pin, as the temperature of the piston is too high for a tinned bearing, or, in fact, in any other bearing which may become excessively hot.

To Divide a Mixed Number by Two

In many lines of work, and particularly in drafting, it is very handy to know a quick way of halving a quantity which is expressed by an odd number followed by a fraction. It is chiefly with large numbers that the advantage of this method is shown, but $9\frac{5}{8}$ will serve as an example.

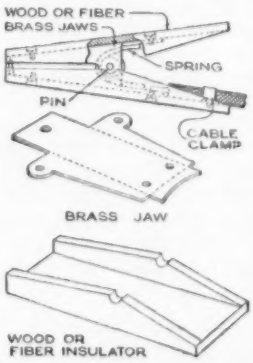
Divide the integral number (in this case 9) by 2, and neglect the remainder (in this case, 1). This gives 4, which is written down as the integral number in the result.

Add together the numerator and denominator (in this case, 5 and 8, making 13) and write it down as the numerator in the result. Multiply the denominator, 8, by 2, and the product is 16. Use this as the denominator in the result, and $4\frac{13}{16}$ is obtained as the final figure.

Little time is saved when the number is a small one, but speed is increased with a minimum chance of error when this method is applied in the case of a large number.—H. A. Pearson, East Chicago, Ind.

Safety Insulated Test Clip

In testing electrical apparatus, it is always desirable to have some means of quickly connecting the apparatus to the electrical supply. Most of such appliances are unprotected against short-circuiting when they come together or against some other object, sometimes causing dangerous shocks to the operator. Others are covered with soft rubber; these, if used around machines and exposed to oil, are often more dangerous than if not covered at all, as the rubber soon is affected by the oil, and cracks or rots, allowing the hand to come in contact with the bare metal.



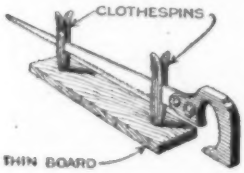
To overcome some of these difficulties and eliminate danger in the test rooms of a large electrical factory, several types of connectors, or clips, were designed and tried out. The upper sketch shows one which has been much used on account of its

simple and rugged construction; it is entirely insulated by a durable covering, which protects the operator from shocks, and prevents "shorts" if clips carrying different potentials come together.

The clip consists of an outside covering of wood or fiber, fastened with six small machine screws to the brass jaws. The screws are countersunk into the covering, and are covered with insulating pitch or compound. The central sketch shows the pattern for the brass jaws, which are made from heavy sheet-brass punchings. They are attached to a pin and a steel coil spring, which should be rather stiff. A brass cable clamp holds the cable mechanically to the clip, and the electrical connection is made by soldering the wires directly to the jaws of sheet brass.

The lower sketch shows the insulating covering, which should be well shellacked or varnished. A good set of these clips will soon become a valued time-saver wherever electrical testing is done.—Philip G. Bernholz, E. Orange, N. J.

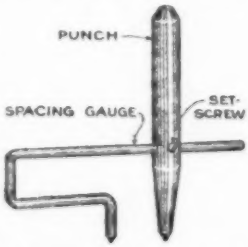
Saw Rack Made from Clothespins



A saw rack for the workbench is easily made by fitting ordinary clothespins into suitable holes in a strip of board.

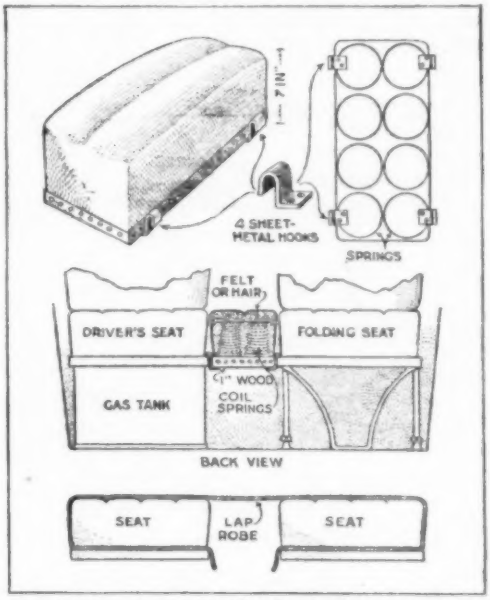
Center Punch with Spacing Device

When a number of prick-punch marks are to be made for a row of holes to be spaced equidistant from each other, much time can be saved by the use of a punch provided with a gauge, as shown. The gauge is first set accurately by means of a scale, and the first mark is punched in the usual way. The point of the gauge is then placed in it, and the second mark made, and so on. If a large number of holes are to be made, and great accuracy is desired, it is advisable to measure the distance from the first punch mark to the eleventh one, as any error in setting the gauge can then be seen magnified ten times.—W. C. Reichard, Syracuse, N. Y.



Extra Front Seat for Closed Car

In a sedan, where it is often desired to carry a sixth passenger, the addition of a detachable, upholstered seat to fill



Two Types of Detachable Extra Front Seats are Illustrated, Which will be Found Useful in Certain Kinds of Automobiles

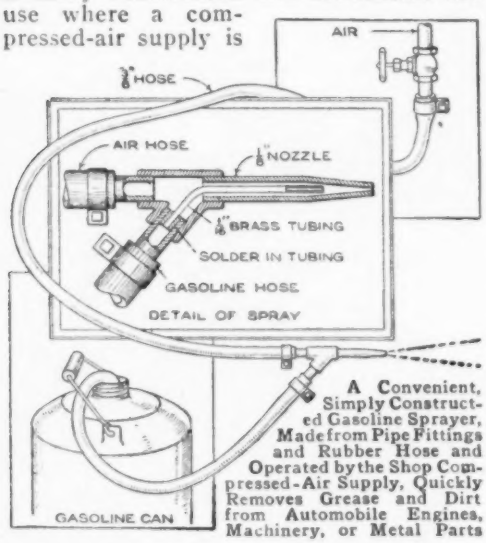
the gap between the front seats is both convenient and practical. Such a seat may be 6 in. wide by 14 in. long. The upholstering is about 7 in. deep. The base of the seat is of wood, about ½ in. thick. On this is placed either five or six coil springs, such as are used in chair construction. A felt or hair pad is fastened over the top. The detachable seat is then covered with the same material used for the interior coverings. The bottom of the seat is fitted with four metal hooks to catch over the edges of the adjacent seats.

In an emergency, the sixth passenger can also be accommodated by means of a robe which is stretched across the adjoining seats and carried under the extreme edges. With the two end passengers seated, he will find the hammock-like robe quite comfortable for riding.

¶ When winding water pipe with paper to prevent freezing, the insulation is considerably improved if pieces of rope are first wound around the pipe, and the paper then placed outside the rope. This gives an air space between the pipe and the paper.

Gasoline Sprayer Cleans Metal Parts

Grease can be quickly removed from machinery, or metal parts, by means of a pressure gasoline spray. Such a spray is easily constructed and convenient for use where a compressed-air supply is available. A 1/8-in., 45° tee is fitted with 1½-in. lengths of pipe in the side opening and in one of the end openings. To these are clamped lengths of 3/8-in. rubber hose, the one at the end opening connecting with the air supply, and the other long enough to reach to the bottom of a gasoline can while the nozzle of the spray is being held at working height.



A Convenient, Simply Constructed Gasoline Sprayer, Made from Pipe Fittings and Rubber Hose and Operated by the Shop Compressed-Air Supply, Quickly Removes Grease and Dirt from Automobile Engines, Machinery, or Metal Parts

The gasoline feed is made by soldering a 2¾-in. length of 1/16-in. brass tubing into the end of the pipe leading to the gasoline supply. This brass tubing is then bent to extend through the remaining end opening at exactly the center line of both end openings.

A 3-in. length of 1/8-in. pipe, forged down at one end, serves as a nozzle. This is screwed into the end opening over the brass tubing.

When compressed air is admitted to the nozzle, a vacuum is created in the brass tubing which draws gasoline from the can. This gasoline is then blown from the nozzle in a fine spray, which quickly removes grease from metal parts. —C. C. Spreen, Detroit, Mich.

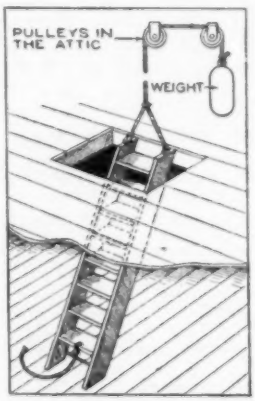
¶Several sheets of paper may be fastened together by punching small holes in the upper edge, pushing discharged cartridge shells of small caliber through them, and clinching with a hammer.

Scrap Iron Repairs Trace

When a wagon trace breaks, a very strong repair can be made at the cost of a few cents by joining the broken ends together with a piece of scrap iron, of the kind that can be found on most scrap heaps. Cut a piece about 4 in. long; drill four holes in it, large enough to admit ¼-in. rivets, and punch corresponding holes in the broken ends of the trace, two in each end. Push the iron into the trace between the stitches, so that it is completely hidden when the broken ends are drawn together. Pass rivets through the holes in the leather and the iron, flatten the ends, and the work is done. It is good policy to splice a trace in this way when it begins to show weakness, without waiting for it to break. The job can also be done by taking out the stitches along one edge, inserting the iron, riveting, and stitching the edge again.—H. F. Grinstead, Columbia, Mo.

Making a Disappearing Stairway for the Attic

Much attic storage space is left unused because there is no stairway to reach it. The only entrance to such attics is a square trapdoor, perhaps in the bathroom or in a clothes closet where a stairway would be in the way, besides being expensive to build.



To make a disappearing stairway for such an attic, two 1 by 8-in. boards may be fitted with steps, as shown. Put a staple in the top of each side section, and attach a piece of rope. This rope should run through a pulley fastened under the ridge pole of the roof. From here it runs through another pulley near a side wall, and the end is weighted with enough iron window weights, or other metal, to equal the weight of the ladder.

When the ladder is not in use, a very slight effort will shove it up through the trapdoor, and out of sight. A slight pull on a short piece of rope tied to the lower end brings it down when wanted.

Electric Fan Displays Sign

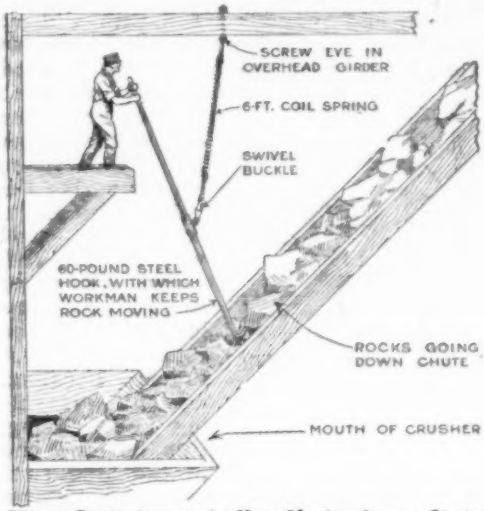
A striking window display advertisement may be arranged with an electric fan, four pieces of sewing thread, 3 ft. long, and a piece of cardboard, 3 by 6 in. in size. The advertisement is printed on the cardboard, and a string is then tied to each corner of the card, and to the wire guard of the fan at equal distances around its circumference. Hold the cardboard at the ends of the strings, and turn on the fan. When the motor attains its maximum speed, release the card. It will move about with erratic jumps and twists, but the advertisement will always be readable.— H. E. Pilkington, Chester, Pennsylvania.

Bracket for Draftsman's Lamp

The photograph shows a convenient method by which a draftsman adjusted the position of a lamp and shade over a drawing board. An ordinary folding telephone bracket was mounted on the wall, near the left-hand edge of the board, and a small block of wood, about 1½ in. square and 2 in. long, was fastened with wood screws to the end of the bracket. A hole was then bored in the front face of the block, to admit the central arm of a pipe tee; and a reducer was screwed into the lower arm of the tee, so that it hung in a vertical position and connected the tee with an ordinary key socket, the wider member of the reducer entering the tee, while the narrower one passed into the socket. The lamp cord was led through the loops in the bracket and down into the tee, from which it passed through the adapter into the socket. This arrangement made it possible to illuminate any part of the board at will, or to fold the bracket back out of the way when not needed.—E. L. Durgin, Auburn, Me.

Chute Hooks Supported on Springs

In nearly all mines and quarries where coarse ore and rock is sent through chutes to the crushers, it falls to the lot of several workmen to be stationed along the chutes to keep the stuff moving. These workmen are usually supplied with long steel hooks, with which they dislodge the rocks when they jam.



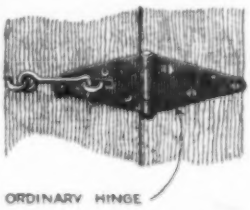
Where Rocks have to be Kept Moving down a Chute, the Hook Required may be Improved by Adding a Support

The hooks used in this work usually weigh about 60 lb. Thus the work of lifting this load all day is even greater than the amount of energy expended in moving the rocks. All this has been eliminated, in one quarry, by the use of spring-supported hooks, as shown in the accompanying sketch.

With the spring-supported hooks, the men are not only able to work faster, but they accomplish the same amount of work with far less effort. The spring-supporting method is primarily a man saver. Workers in other mines and quarries would do well to adopt the idea, which is decidedly a profit-maker for both the employer and his workmen.

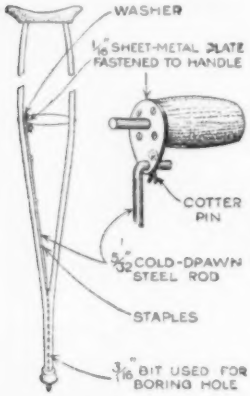
Strap Hinge Used as Hasp

When a hinge hasp for a barn door was badly needed, and was not at hand, a very good substitute was made from an ordinary strap hinge. One half of the hinge was attached by screws, as usual, to the door casing, and the free half was cut out by means of a drill and cold chisel, to take the staple. The free end of the hinge was turned back slightly for a grip.



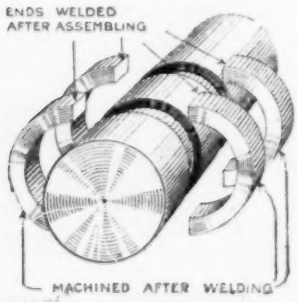
A Crutch Safe to Use on Ice

An ordinary crutch can be made safe to use on ice by boring it through the center, and running a rod with a sharp end down from a lever on the handle, so that by turning the handle the pointed end is made to project from the end of the rubber tip. Use a 3/16-in. bit for boring the hole, and a 5/32-in. cold-drawn steel wire for the rod. Drive three or more staples loosely over the rod, to keep it from buckling, without preventing free sliding. File off one end of the long rivet which runs through the handle, remove both rivet and handle, and saw about 1/4 in. off the end of the latter. Make a plate, as shown in the drawing, of 1/16-in. sheet metal, and fasten it to the end of the handle with four screws. Put the handle back in place, inserting a washer, about 3/16 in. thick, to keep the plate away from the side of the crutch. Bend the end of the 5/32-in. rod, and fasten it with a cotter pin. Rivet the handle so that it will turn easily.

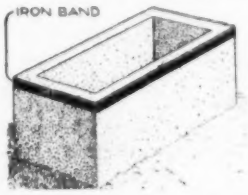


Building Up a Worn Shaft by Welding

A shaft in a machine shop became badly worn at the ends, where it rested on bearings. The defect took the form of deep grooves, two at each end, caused by friction between the shaft and the edges of the oil holes; the latter had scored the surface of the shaft as it traveled past them, and had eventually worn grooves in the metal. It was decided to make repairs, but it was not considered practical to fill the cavities by welding new metal to the shaft, as the latter would probably be sprung by heating. The spaces were therefore filled with rings, cut in halves, and welded together again after they had been placed in position. The rings were simply disks with holes bored in them, corresponding to the diameter of the grooves; and after the two halves of each had been welded together in the grooves, they were machined until their outer diameter corresponded to that of the shaft. As the grooves were at the ends of the shaft, the weakness caused by the loss of metal was not a serious matter; the function of the loose rings was merely to finish out the bearing surface.



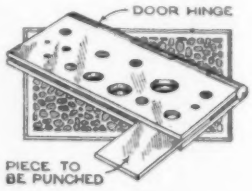
Protecting Edges of Concrete Tanks



A band of 3/16 by 2-in. strap iron, bent to shape, bolted, and inserted in the forms, will protect the edges of a concrete tank.

Hinge Forms Die for Use with Hand Punch

Punching holes in light metal by hand is a very useful process, and saves much time which would otherwise be spent in drilling. Moreover, it is possible to punch a hole even through spring steel, so hard that it could not be drilled. The requisite tools are a heavy hammer, a nail set with very slight taper or no taper at all, and some kind of die and stripper. The last two items are well taken care of in the method illustrated. An ordinary butt door hinge is drilled with various sizes of holes, and a punch or nail set is provided to fit each one. The work is then inserted between the leaves of the hinge, the punch placed in the hole, and a good heavy blow from the hammer will produce a clean, fairly accurate hole in the work. The method is of special value to those who use pieces of clock spring, or of spring brass or bronze, in the construction of various small devices.—W. C. Loy, Rochester, Indiana.

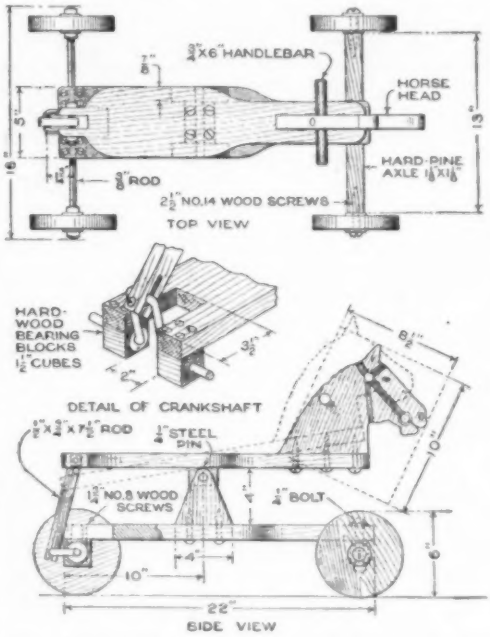


A Trotting Hobbyhorse

By F. D. BURKE

THE toy that in any way resembles a horse is usually the first one to win the affections of a child. A little trotting horse that will provide an abundance of healthful exercise and an endless source of amusement, can be constructed in a few hours at an expense of less than $1 for material.

For the principal wood parts, procure two pieces of poplar, or clear pine, dressed to ⅝ or ¾ in. thick. One piece should be 6 in. wide and 6 ft. long, the other 9 by 12 in. On the short piece, the head of a horse should be outlined with a pencil; and on the 6-ft. board are outlined the four wheels, the body board, the baseboard, and two triangular blocks on which the horse rocks. The board is then taken to the nearest woodworking shop and the various parts cut out on a band saw. The work, if done this way, will take but a few minutes, whereas, if done by hand, it will require two hours or more, and the finished parts will not look so well.



With a Steed Like This, the Young Jockey can Gallop All around the Back Yard. The Speed Attainable Is Not High Enough to Cause Any Anxiety

The various wood parts should next be given one or two coats of bright paint. An attractive color scheme is to paint the entire toy, with the exception of the wheels, a bright red, the wheels being painted a bright green. The mane, bridle, eyes, nostrils, etc., are afterward painted black. While these parts are drying, attention can be given to the axles. The rear axle should be bent to the form of a single-throw crank, of the dimensions given in the detail. The material, ⅜-in. bessemer rod, can be purchased in 4-ft. lengths in hardware stores. A piece 20 or 21 in. long should be used. Right-angle bends can be made in this material without the use of heat, the only tools required being a vise and a fairly heavy hammer. After bending, the axle should be cut to the dimensions given, and the ends threaded for a distance of 1½ in.

The finished axle is mounted as follows: Two hardwood blocks of the size indicated are drilled with ⅜-in. holes, and, preceded by two tight-fitting washers, are slipped over the ends of the axle. The blocks are attached to the baseboard with wood screws, as shown in the lower view. The washers are then pushed up against the blocks and held there by one or two deep punch marks in the axle. This will serve to hold the crank properly centered. The rear wheels are held in place by nuts and washers, as shown in the upper view, the nuts being drawn up tightly and held in place by punch or chisel marks in the axle.

The front axle, a piece of hard pine of the dimensions given, is pivoted at

the front end of the baseboard. The wheels are attached to the axle by long stout screws. The two triangular blocks on which the horse rocks are similarly attached to the baseboard, at the points indicated. A block that will fit snugly between these triangular pieces is screwed to the underside of the rocking board. The latter is then mounted on a long pin, as shown.

For the handlebar, a 6-in. piece of ¾-in. dowel should be driven through a hole in the head, at the point indicated, and fastened with a light nail.

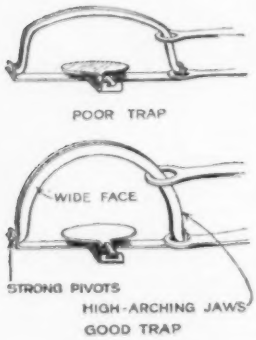
The connecting rod is made in the following manner: A ⅜-in. hole is drilled near one end in a piece of hard wood of the dimensions given. The piece is then slotted at this end, as shown. With a little care, the piece can be sprung over the crankpin of the rear axle. A screw in the end of the piece will serve to hold it in place. To arrive at the correct length between holes for the connecting rod, place all parts of the toy in the position shown in the bottom view. The proper place for the hole in the upper end of the connecting rod can then be located and the hole drilled. This end of the connecting rod is held in place by means of a ¼-in. bolt.

The horse, as described, is suitable for a child from three to five years of age. In riding the toy, the child sits on the horse just over the point where it is connected to the base, his feet resting on the front axle. He grasps the handlebar, working it up and down, thus giving the horse a rocking motion, and propelling it at the same time. Steering is done with the feet.

How to Tell a Good Trap

The trapper who buys steel traps at their present high cost, and catches furs that are often worth small fortunes, should select a trap that is highly efficient.

The best kind of a steel trap arches up, when its jaws are closed, in an almost perfect half circle, while traps that are poorly built have low-gripping jaws. The high-catching trap holds the animal high up on the leg, so that it cannot free itself by struggling, while the low-gripping jaws may only pinch a toe or the foot. Be sure, also, to select a trap with wide-faced jaws. This provides against the trap cutting off, with its sharp edges, the delicate leg of a valuable mink. Jaws that come together with thin rounding faces are sure to allow the animal to twist about, and its foot to become severed. Some traps are built with a jaw face of ½ in. to ¾ in., while others carry extra grips below the jaws.



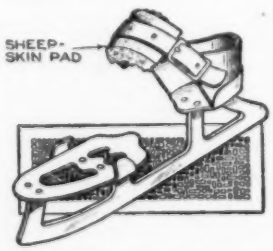
Look well at the pivots where the jaws hinge onto the frame of the trap. These should be strong, and work smoothly in their bearings when the jaws are opened. Buy only a trap the spring of which has been "water-tested" by the maker, and is so warranted by him. Another matter to look into is the length of chain provided with the trap, since many poorly built traps have chains from 6 in. to 1 ft. too short.—F. E. Brimmer, Syracuse, N. Y.

Face Protector for the Motorcyclist

A motorcyclist who had to do a great deal of riding during cold weather found that the best protection for his face was afforded by a piece of an automobile curtain. This was looped around and pinned, or tied, behind his head, the celluloid window being in front of his eyes. By rubbing a little alcohol on the celluloid to make the rain or snow run off freely, the protector did good service on winter days.

Soft Pads on the Skate Strap

A skate strap usually cuts or rubs where it crosses over the arch of the instep. This painful fault may be remedied by fitting a soft pad to the strap. Such a pad is made by riveting a double thickness of sheepskin, about 3 by 4 in. in size, to the strap. This, when so padded, may be pulled tight, without causing discomfort to the skater, yet holding the skate perfectly.—C. A. Black, Hightstown, N. J.

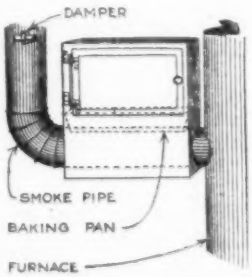


Rubber Tubing for Radiator Leaks

When a leak in an automobile radiator of the tubular type is too large to be soldered, a satisfactory repair job can be done with rubber tubing, and pieces of the right size can generally be bought in drug stores. It is more practical to use this method than to close the leaking tubes with pliers, as the latter practice makes it difficult to drain the radiator. First, cut about 2 in. from the radiator tube, removing an equal portion on each side of the leak; then slip a piece of rubber tubing, about 6 in. long, over the ends, and secure it by winding thin wire around it. Two or three turns of the wire are enough to hold the rubber, after which the ends can be twisted together and the surplus pieces removed. Be careful not to leave rough edges where the leaky portion of the tube is cut away; a clean cut will make the repair much more lasting.—Wesley S. Malloy, Whitefish, Mont.

Warming Oven on Furnace

The heat of a furnace smoke pipe may be utilized to keep a simple warming oven at the proper temperature. For the oven itself, almost any kind of metal shipping case, discarded metal oven, or specially made thin metal box may be used. The front is fitted with a hinged door which has a simple catch. A bake pan is riveted to the inside of the oven, just above the furnace pipe, for which purpose holes have been cut in the sides of the oven. One important detail is that the damper must not be placed between the oven and the furnace, but between the oven and the chimney. This insures the oven being supplied with heat whenever there is a fire in the furnace.—M. E. Duggan, Kenosha, Wis.



A Child's Play Window

When the weather turns cold, and a child misses his outdoor play, he can get a great deal of consolation out of a window arranged as shown in the photograph. Under the window is built a spacious shelf, just high enough to be handy for the child when sitting in the chair. In the center of the shelf is a door, which, when swung upward, opens up a cabinet where there is plenty of room for toys. When the toys are brought out, the door is swung down again and forms part of the shelf, on which many houses and railway systems can be laid out. Not the least of the advantages of the play window is that it is likely to diminish the amount of floor space which is usually found covered with toys.—F. E. Mashburn, Chicago, Ill.

The Broad Shelf, Built at a Convenient Height under a Bay Window, with a Space Below for Keeping Toys, will Keep Small Hands Busy during Many a Rainy Day

Wainscoting Made from Matting

Torn or marred wall paper may be covered by a very attractive wainscoting made from straw floor matting, of a pattern and color that harmonizes with the remainder of the wall. The matting is fastened to the wall by means of molding at the bottom and top edges, and by panels every four feet. Quarter-round molding is best for the bottom, but half-round molding, or strips of thin board 4 in. wide, should be used for the top and for the panels. If the matting is stretched tightly, the resulting appearance will be a decided improvement over the scratched or soiled wall paper.—H. F. Grinstead, Columbia, Mo.

Toy Garden of Real Plants

An amusing and unusual Christmas gift for the small brother or sister is this toy garden; it is not a make-believe or a paper affair, but one in which things really grow, just as they do outdoors.

A Toy Garden, Made with but Little Trouble and at very Small Expense, from Moss, Paper, and a Few Small Plants, will Brighten the Home at Christmas Time

The garden should be made in a shallow wooden box of any width, but 3 or 4 in. deep, and long enough to fit the window—36 by 24 in. is a good size. A few pebbles, or a little sphagnum moss, obtainable from any florist, should be put in the bottom for drainage. Then the box should be filled to within ½ in. of the top with soil that is chiefly sand. A good mixture is one part black soil and two or three parts sand.

The house to which this garden belongs may be about the size of a wooden starch box; a small doll's house may be moved from the playroom to this more interesting site, or some country house may be reproduced by means of thin wood, or cardboard, glue, and water colors. The drives and paths may be laid out as the builder pleases. Fine gravel makes a good roadbed. Flat pebbles may be used as flags for a walk. If there is to be a sunken garden a little below the level of the house, building blocks make excellent steps.

Then comes the planting. For the lawn, mustard seed may be used, sown quite thickly, covered lightly, pressed down, and watered thoroughly. It will grow up in about a week. Dwarf sweet alyssum, sown as in a garden, makes a good shrub. For hedges, use bushy tips of arbor vitæ, stuck into the sand. These may be trimmed square with scissors, and, if watered occasionally, will keep green all winter, and often even take root. The arbor-vitæ tips untrimmed make attractive shrubs. Privet cuttings and any other evergreen seedlings may be used for trees. They should be planted before sowing the lawn. Very small potted bulbs, such as the crocus and grape hyacinth, are pretty in the toy garden.

The garden ornament may be varied. Building blocks sunk in the sand make excellent columns for a pergola, and a vine of English ivy from a pot can be made to shade it. The little garden may be adorned by the addition of a sundial, modeled from clay, with white pebbles, as cobblestones, at its base. For a pool, the saucer of a flowerpot may be sunk in the lawn in the center of the garden. A little time spent in planning and executing the design for the garden adds to the appearance of the gift.

Making Sticks of Charcoal

Charcoal sticks, such as used for drawing purposes, can be made at home. Cut sticks of wood to the size desired for the sticks of charcoal. Wrap a piece of wire around each stick, leaving a long end on the wire for a handle. Melt a quantity of lead or babbitt in a tin can, just deep enough to cover the stick. Plunge the wood into the molten metal quickly, to avoid bubbling. Examine it from time to time, as it may become too crumbly to use if left too long.

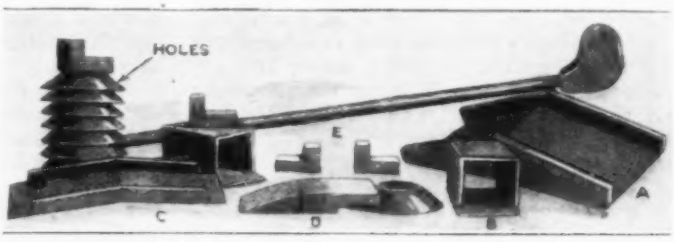
Silencing the Typewriter

The unpleasant noise made by a typewriter can be largely silenced by interposing vibration absorbers between the machine and the floor. Linoleum of some plain color may be used to cover the table top. This is compo ed mainly of cork, which does not transmit readily the vibrations that produce the noise. Putting rubber tips on the table legs completes the remedy, which will result in almost silent operation of the machine. —Jack Solon, Natchez, Miss.

Golf for the Winter Evenings

When the wind blows cold outside, in fact too cold for comfort, stay at home and play golf.

The indoor course consists of nine holes, each a gray-iron casting, made from a wooden pattern of similar shape. All these holes may be made of wood, but the other method is less laborious. Then as to the hazards: The hilly approach to the first hole, shown at A in the photograph, makes a good start for the game, while the tunnel B, for the third hole, is slightly more difficult. The shaped piece marked C is the approach to the fifth hole; it changes somewhat the regular style of playing, and adds to the interest and skill of the game. Another tunnel like B is adapted to the seventh hole, and a hard finish is handed the player by the narrow grade approach D, to the ninth. The diagram shows how the course is laid out, with the spacing blocks E placed in front of the other holes, not already mentioned.



The Holes, the Hazards, and the Club for an Indoor Golf Course: These Are Gray-Iron Castings, with the Exception of the Club, Which Is of Pine Wood

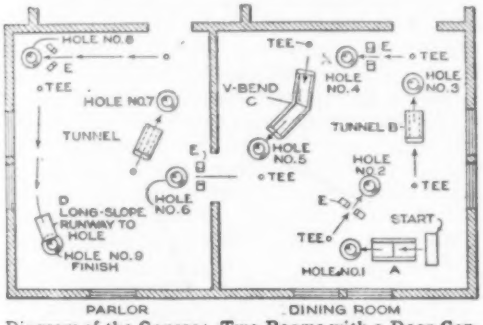


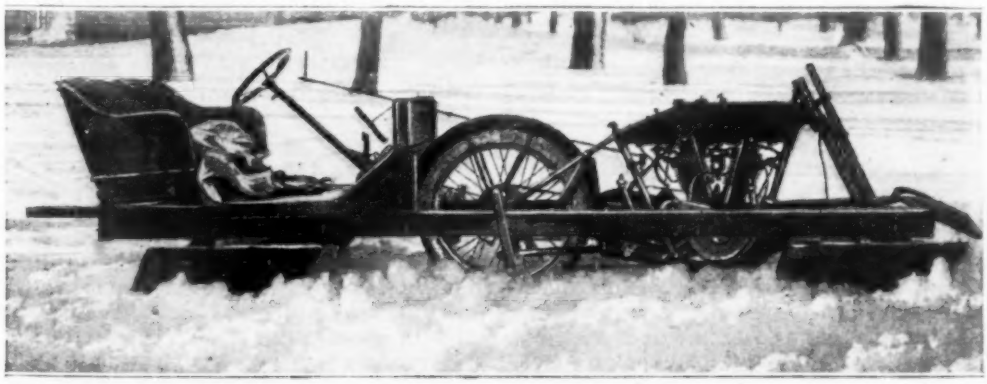
Diagram of the Course: Two Rooms with a Door Connecting will Give Plenty of Room for the Nine Holes

As will be noted, a dining room and parlor serve for the "links."

The complete equipment, except the iron pieces above mentioned, is made of ordinary pine wood at very slight cost.—J. H. Moore. Toronto.

Power Sled Made from Motorcycle

A Nebraska boy wanted to take his girl out for a sleigh ride, but had no horse. The accompanying photo shows how he solved the problem. This motorcycle sled is steered by turning the front runners by means of rods running back to the wheel. The throttle, spark, and clutch levers are all within convenient reach of the operator; the "clutch" consists of a lever arrangement for lifting the drive-wheel from the ground. A chain on the wheel affords traction, and it is possible to make 10 or 15 miles per hour where the road is broken. Of course, where a deep drift is encountered, the driver must resort to a shovel.



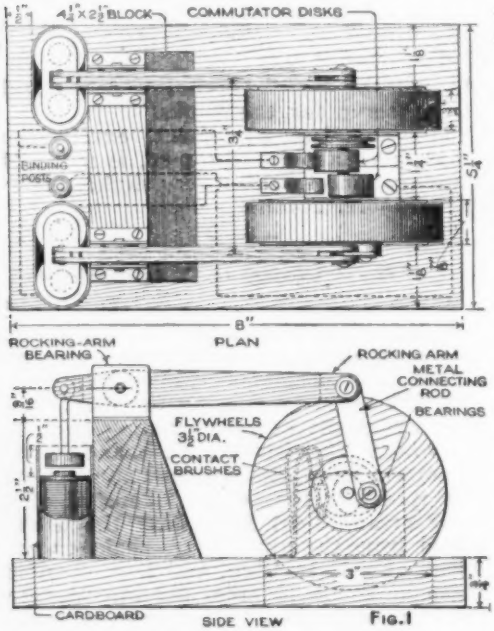
The Motorcycle Rider Who Builds a Sled of This Type can Mount His Machine in It While the Ground Is Snow-Covered, and can Readily Remove It and Remount the Front Wheel and Handlebars at the End of the Sledding Season

A Model "Twin" Electric Engine

By L. B. ROBBINS

THE twin-cylinder electric engine is of interest to the toy maker chiefly on the ground of its businesslike appearance, its smooth-running qualities, and above all, the fact that it is practically self-starting. The one here described can be made without a lathe, using the ordinary hand tools, if some round pieces of wood and metal can be found. The engine is powerful enough to run many kinds of toy machines.

As shown in the assembly drawing, Fig. 1, the engine is built on a base, or bed-



The Electric Engine Is Very Similar in Its Working to a Two-Cylinder Single-Acting Steam or Gas Engine

plate, consisting of a wooden block, with two slots cut in it to take the two upright wheels. After they are cut to these dimensions, two double-spool electromagnets from old electric bells are mounted on the block in the position shown. Arrange a piece of cardboard around each pair of spools, so as to inclose them and project slightly above them. The rocking arm is made up of three thicknesses of cigar-box wood, as shown at the top of Fig. 2. The dimensions given provide a leverage of four to one, so that the crank of the engine will have four times as much motion as the armatures of the electromagnets. The sections of the arm are glued together, heavy weights being set upon it until the glue has hardened. The middle section is made shorter than the outer ones, to provide forks at the end to take the armature rod at one end, and the connection rod at the other end. The pivot hole is drilled straight through all three sections.

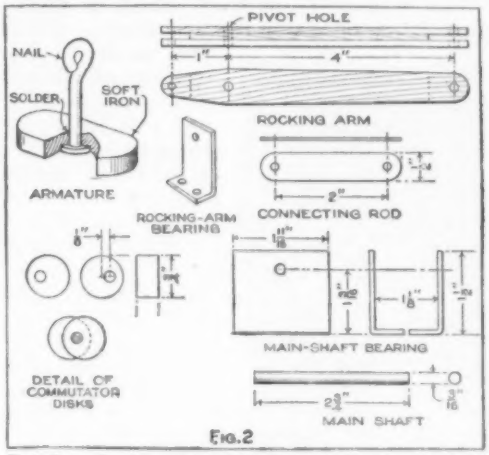
The two flywheels, ¾ in. thick, are cut out of some heavy wood, like oak or ash; have a ⅛-in. hole drilled through the exact center of each, and should be balanced by removing some wood with a knife on the heavy side, until they will run true without wabbling. Smooth off the faces with fine sandpaper, and varnish with shellac. The large bearing block can be cut out of almost any kind of wood, and is made wider at the bottom, so as to give stiffness. It is fastened solidly to the base with glue and screws. The two rocking-arm bearings, detailed in Fig. 2, are screwed on top of this block. Set the halves of each bearing so that the center of the space between them will come in line with the center of the corresponding magnet.

The two armatures can be sawed out of some soft scrap iron. It is important that the iron should be soft; this can be tested by hammering a small piece and noting whether the material is readily nicked by the hammer blows. The rods from which the armatures are hung are ordinary nails, with the points filed off and the ends bent to form a loop. The nails should be a drive fit in the armature iron; if the smooth part of the nail slides a little loosely in the hole which is drilled in the armature, the part near the head will probably come sufficiently tight, owing to the clamp marks in it.

The connecting rod should be made of quite stiff brass, but the two brushes must be made of very thin spring brass, or bronze, so that they will not introduce any great friction. The main bearing is made like the rocking-arm bearing, from two pieces of brass, bent to a right angle. The two halves of the commutator can be sawed out of ¾-in. round brass rod. In each of them is drilled a 3/16-in. hole, offset ⅛ in. from the center of the disk. The main shaft is made of a piece of steel rod, 3/16 in. in diameter, and carries the commutator, flywheels, and pulley. Assemble them, in the order shown, upon the shaft, also placing the two halves of the bearing in position. The commutator disks are soldered to the shaft so that their widest sides come exactly opposite. The pulley

can be made of brass, or of hard wood if more convenient. When the commutator, bearings, and pulley are properly placed on the shaft, adjust the flywheels on each end of the shaft, driving them on to make a snug fit. Place washers between them and the bearings. When fully assembled and adjusted to run free and true, fasten the bearing halves in position upon the base, so that the shaft will still run freely. The connecting rod is attached to the rocking arm and the flywheel by small brass screws, working freely where the motion occurs. Those in the flywheel should be set 3/8 in. from the center of the shaft. When the armatures are assembled at the other end of the rocking arms, the armature should work up and down as the shaft revolves, but should never touch the magnet cores. The length of the armature rods should be made so that this condition is just secured, or some kind of shims may be placed under the magnets to make this adjustment, if found necessary. The cardboard around the magnets prevents the armatures from swinging outward, and also gives the appearance of engine cylinders.

The contact brushes should then be mounted and adjusted so that each magnet will be energized just as the crank comes to the position where its pull may be effective. Each brush should make contact for just slightly less than half of the revolution of the shaft, so that unless the engine happens to stop just on "dead center," it will be self-starting. In this respect, it is analogous to a steam engine. The wiring diagram is embodied in the assembly view, Fig. 1; the dotted lines indicate wires, which are laid permanently in grooves on the bot-



Details of the Principal Parts of the Engine: These may All be Made with Familiar Tools, from Common Materials

tom of the block, and are brought up through it to the bearings, or "ground," the brushes, and the two binding posts. The terminals of the battery are, of course, connected to the two binding posts, and the engine is ready to run. The voltage and current it will take, as well as the power and speed it will develop, will, of course, depend on the electromagnets used. It will be well to set rubber buttons on the underside of the base to take up some of the vibration.

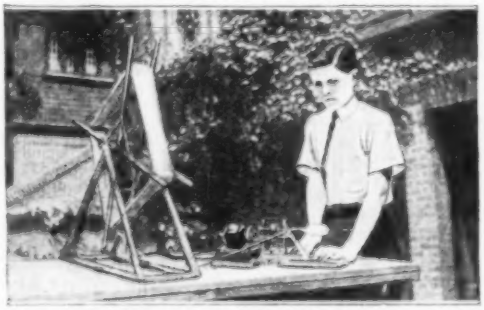
Caution should be observed that screws are not allowed to become loose at high speed, as the engine may reach a speed which might make this condition dangerous.

Film for Kindling Fire

Campers will find that bits of celluloid film—which may be secured from motion-picture machine operators for the asking—will greatly facilitate the lighting of a fire, especially when the wood is slightly damp. The film lights quickly, and burns with a fierce heat.—Jack L. Dickler, New York, N. Y.

Electric Motor Winds Woolen Yarn

For winding skeins of wool into balls, a boy who owns a toy building set used some of the metal parts of this outfit. He made a large steel-frame wheel, on which the skein of wool was placed, and mounted a rod with a pulley for receiving the wool. By means of a belt the pulley is connected to a small electric motor, the operator guiding the wool as it is wound up. The motor is driven by the current from a transformer connected to the house-lighting mains.



A Toy Building Set Supplies Parts for an Outfit Used by a Boy to Wind Yarn into Balls

Snow Shoes Made from Tin Can

In a western mining camp, a recent development is metal snow shoes. These are made of tin, cut out of oilcans. A piece of stiffer sheet metal is run lengthwise, along the center of the bottom of each shoe, turning up at the front. The two pieces of sheet metal are held together by several rows of clinched nails, and provision is made for attaching the shoes to the foot by adjustable leather straps. The length of each shoe is 3 ft. 4 in., and the greatest width 14 in. The weight is 4½ lb. Such shoes have been found to support successfully a 6-ft. man, weighing 170 lb., making a depression of from 3 to 6 in. in a 3-ft. depth of snow. No trouble is encountered from slipping.—Allen P. Child, Kansas City, Mo.

Vase Made from Coconut

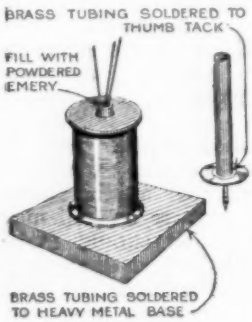
A pretty vase can be easily made from a coconut shell. First, saw the coconut in two, crosswise. Saw the end from one of the halves. With a file, remove the rough surface of the shell, then sandpaper it, and finally polish it with a cloth. Various designs may be carved upon the surface, one of the simplest being that shown in the picture. It is made with the aid of a compass. Copper or brass strips may be used for decoration, and also to hold the two sections of the vase together, or the sections may be glued. The shell takes an excellent polish, resembling mahogany.

A Chemical Fire Fountain

A miniature fireworks display can be given at a Christmas party by using a few inexpensive chemicals. Pour 6 oz. of water into an earthenware bowl (do not use a metal one). Add 1 oz. of sulphuric acid, but, to avoid danger, pour this carefully into the water, holding the graduated glass at arm's length. Then add ¾ oz. of granulated zinc, and follow it with three or four pieces of phosphorus, about the size of a pea. After a short time, gas bubbles will begin to rise, and when they reach the surface they will burst into fire. Soon the whole surface will be brilliantly illuminated with fireballs, and a very striking effect will be produced, particularly if the room is darkened. The display is not attended by any danger, but it is well not to let anyone lean over the bowl while the bubbles are bursting.—S. Leonard Bastin, Bournemouth, England.

A Simple Needle-and-Thread Holder

To keep the needle and thread in a convenient position while working, the following device has been found extremely handy for the housewife.



Cut to the length of a common spool a piece of brass tubing of a diameter to fit loosely in the center hole of the spool. Solder this tube vertically to a base of some heavy metal, about 3 in. square. Fill the tube with powdered emery, and plug the top with some fancy silk; this acts as a needle container. If a metal base is not readily obtainable, solder the tube to the head of a thumb tack. When in use, the required spool of thread is slipped over the spindle formed by the tube, and the whole is placed in a convenient position.

Wicks from Felt Hats

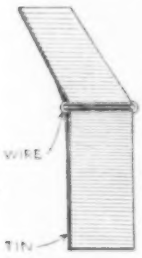
No man need buy woven lamp wicks, if he has an old felt hat to cut up. With sharp scissors, cut the felt into strips of the right width for the burners, but be careful not to leave any ragged edges. Then put a strip into each of the burners, just as an ordinary wick. It will give a strong, clear flame, will need little trimming, and will not smoke.

¶ Sticky playing cards may be made clean and easy to handle by spreading them on paper, sprinkling with talcum powder, then wiping with a clean cloth.

Nails Hold Cement Walks Together

Cement walks are usually made in two layers, the lower being a coarse mixture of cement, sand, gravel or crushed rock, and the upper being a fine mixture of sand and cement which takes a smooth finish. In many cases the upper layer becomes loose after weathering a cold winter, or in the summer heat. To prevent walks from breaking up in this way, old nails may be used to bond the two layers together. The coarse layer is first poured and tamped in the usual manner, then the nails are inserted, at a distance of from 4 to 6 in. apart, and projecting about ¾ in. above the concrete. The upper layer, about 1 in. thick, or coming not less than ¼ in. above the heads of the nails, is then poured on and smoothed. The result is a walk that holds together, and the first cost is practically the same as the regular walk, if old nails are used.

A Quickly Made Hinge



A light hinge can be made by cutting two pieces of sheet metal to size, placing their flat sides together, fastening a wire around them at the center, then bending the wings out and nailing the hinge into place. The wire must be strong, for the weight falls on the loop.

Adjusting Tabulator on Billing Machine or Typewriter

A question of timesaving arises in using the ordinary billing machine. When adjusting the bill form under the roller, it is generally necessary to do some experimenting with the stops, so that the tabulating mechanism will be set to correspond with the arrangement of the columns on the bill. Whatever adjustment is made will only apply to a certain form, and when another kind is used, the experiment must be repeated. To shorten the work, the accounting department of a large store painted the scale on each of their machines to correspond with their bills. Only two forms were used, one with seven columns and one with four, so that white marks made on the scale enabled the operator to set his pointer for the seven-column form, and red marks took care of the four-column form.—Abel Green, New York, N. Y.

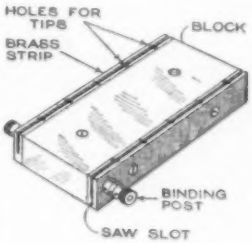
Paper Shelters for Flowers

Exposure to very bright sunshine is a considerable factor in shortening the lives of many flowers; and excessive rain, even if not violent, can have the same effect—also heavy dew. In such cases it is necessary for the florist to provide some protection, particularly when the bloom is just opening, and has not attained sufficient growth to resist weather conditions which might later on prove harmless.

One of the cheapest and most effective shelters for flowers is a sheet of paper twisted in the manner shown, and fastened by pins to a stick. With such protection the flowers retain their coloring, and last for a much longer time than if completely exposed.

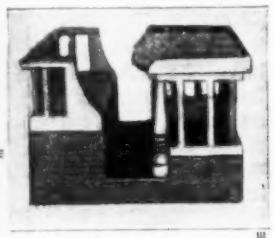
Multiple Telephone-Receiver Connector

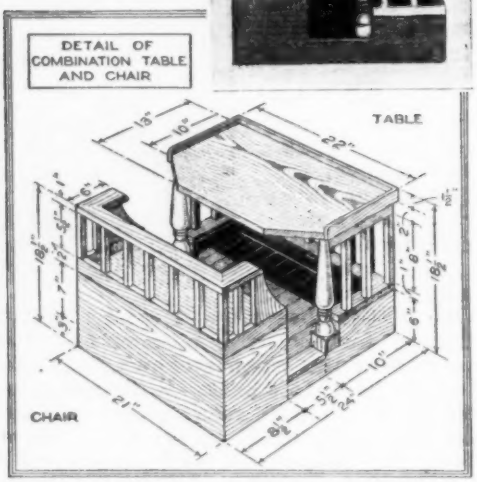
It is often found convenient in experimental work to have a number of telephones connected in parallel, so that a number of men may "listen in" at the same time. The device shown in the sketch is very useful for making such connections, and is easily made in the workshop. It consists of a strip of wood, or other insulating material, on opposite sides of which are mounted two brass strips, which have been partly sawed in two longitudinally, after drilling holes for receiving the cord tips. A binding post is fastened to each strip and is used for making connections. Holes are then drilled on the flat side to fasten the strip to the insulating block. The split strip will be springy enough to hold the small tips very securely. Separate strips can be used if preferred, and grooves filed in them to take the tips. —Frank Sahlmann, Manhattan, Kan.



Child's Table and Chair

A table built somewhat like a child's high chair, but resting directly upon the floor, gives to the small child the freedom which it appreciates so much, and reduces the danger of the little one's falling out. The accompanying photograph gives an idea of the appearance of this chair. The principal dimensions are given in the drawing. If desired, shelves or compartments for small toys or other belongings can be built under the top of the table, and the busy mother will find it a great relief to have a place where the baby may be induced to stay for a fairly long period without encountering emphatic objection on the part of the child. Care should be taken to sandpaper, or otherwise round off, all sharp corners and edges. The table should then be enameled. A good color combination is white for the table, arms, and back, and light green for everything below.—Emil Rehorek, Chicago, Ill.





A Combination Chair and Table may be Made Very Attractive to the Young Child, and at the Same Time be a Great Convenience to Its Parents

Body Dimensions Used for Measuring

In several lines of work the need of a measuring scale constantly arises, and many forms of relaxation, such as gardening, give occasion for taking dimensions. A pocket rule will take care of most cases, if it is always carried; but when it is missing the owner is in a difficulty.

It is possible to be independent of yardsticks and folding scales if certain body dimensions are memorized. The most familiar example is the "pace," or the distance measured on the ground between the two heels when taking a step, a thousand of which constituted a Roman mile. This is still a common emergency measure, but as the same person is likely to take long or short strides in "stepping" distances, it is rather unreliable. The ancient "cubit" became an arbitrary measure, varying in length with different nationalities, but as the word means "forearm," it may serve as another example.

It is a good plan to make a note of certain body dimensions which can be used as guides in measuring an inch and a foot. For the former, use the end joint of the thumb, measuring 1 in. from the quick of the nail to one of the wrinkles over the knuckle; it is not difficult to remember which wrinkle is the right one. For a foot, place the elbow against a wall, and measure the distance between the wall and one of the wrinkles on the wrist. A small person may find it necessary to modify these two methods a little, but he will have no difficulty in using the thumb and forearm as guides.

Sailors sometimes measure fathoms (six feet) on a rope by stretching out both arms at right angles to the body, holding the rope taut between them, and allowing a slight amount over, as the distance is rarely six feet with men of ordinary size. It is not a bad idea, therefore, to mark a horizontal line on a wall, five feet long, and to compare its length with the distance between the tip of the middle finger of one hand and any wrinkle or other mark on the other hand which coincides with the end of the line when the outstretched arms are held against it.

It is a mistake to try to remember too many dimensions, as there is then a chance of forgetting them all; but if more are desired, the span of the outstretched fingers may be used, and the distance from the floor, in even feet or inches, of an eyebrow, face wrinkle, lip, nostril, or other facial mark.—C. L. Lothrop, Jr., U. S. S. "Michigan."

¶ Soap does not dissolve in gasoline, and if plastered over a leak in an automobile gasoline tank it will plug the hole effectively till the car gets home. It is a good plan also to rub soap on the threads of the union nut which holds the carburetor to the intake manifold, thereby making a gasoline-tight joint.

Trough for the Food Chopper

Every housewife has cleaned up her table when done with a job of grinding with the food chopper. No matter how careful one may be, crumbs or particles of food escape to the table top instead of falling into the pan used as a receptacle for the ground or chopped food.

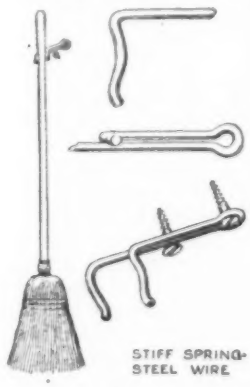
A trough, made from tin, is a great help. It fits closely around the chopper, collects the falling particles, and guides them into a pan. A wire bail at the top of the trough keeps it in place. No dimensions can be given, since there are all sizes of choppers, but the sides of the trough should be made high enough to prevent the crumbs catapulting over. The upper end of the trough is cut with an apron which fits back under the nose of the chopper.

To Remove Paint from Metal

The amateur painter who wishes to refinish his automobile, or to do any other repainting job on metal where neat workmanship is required, will find it necessary to remove old paint from the surface before starting. To accomplish this easily, saturate one or two large pieces of newspaper with kerosene, lay them flat on the surface which is to be cleaned, and light them at one edge. Then, following the burning edge of the oil-soaked paper, scrape away the soft paint before it cools.

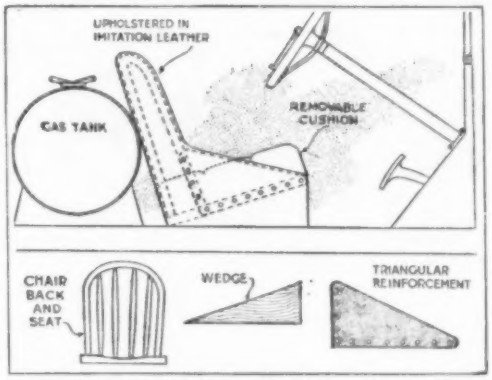
Bent-Wire Broom Holder

A very simple broom holder, made by bending a piece of stiff steel wire, is shown in the drawing. The broom is inserted by merely thrusting the handle up between the two prongs of wire, and is clamped by the effect of its own weight, when it starts to fall. To remove the broom, lift up the holder, and the broom will drop out. An advantage of a broom holder built on this principle, is that the broom can be inserted or withdrawn by the use of one hand only.—Chas. A. Pease, Monrovia, Calif.



Speedster Seats from Chairs

Seats suitable for a rebuilt speedster may be made from two substantial chairs,



Seats for the Speedster-Type Car can be Readily Made from Two Old Chairs, the Legs Being Unnecessary for This Purpose

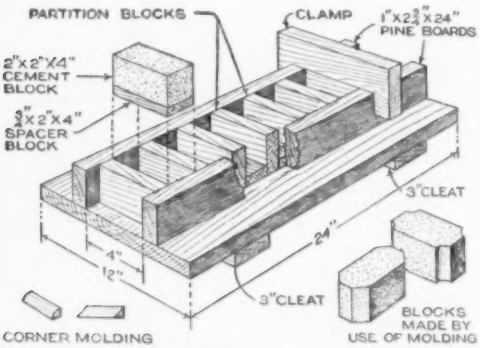
and for this purpose chairs which may have been discarded by reason of broken legs are still useful. The legs of the chairs are knocked out, or sawed off flush with the bottom. The backs may be padded, for comfort, but if this is not desired, the frame only may be covered with imitation leather. Detachable cushions for the seats are also covered with imitation leather, and stuffed with hair or excelsior. The solid-bottom type of chair, if used, is strong enough to be bolted through to the car floor, and if desired, a rakish tilt can be given the seats by using wooden wedges. Further reinforcements of the seats can be made by adding triangular pieces of sheet metal on the outside edges of each seat. Where cost is an item to consider in rebuilding a car, this adaptation will result in quite a saving.

Emery Cloth Smooths Typewriter Platen

Hard service produces dents in the rubber of a typewriter platen. These result in poor work. To remove them, insert a piece of the finest emery cloth or sandpaper, just as if it were to be written upon. Then revolve the roller as in spacing between lines. Repeat until the raised portions are worn down. The type and other mechanism should be protected from grit during the process. Wipe the platen off carefully before using. If it is worn too much, wrap a piece of paper around it, and paste into place. A paper used in this way will prevent the platen from becoming bumpy in the first place.—Mrs. Anna G. Miles, Vermont, Ill.

Making Toy Blocks of Cement

Cement molding, as a hobby, gives very wide scope for individual taste and ingenuity, so that its fascination continues



From Making Cement Molds of a Simple Type, the Beginner Soon Progresses to Designs of Real Decorative Value

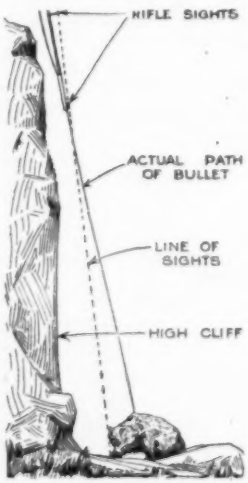
to grow as the worker develops proficiency. There is not much difficulty in preparing the cement, but a good deal of care is needed in making and fitting the molds.

Begin by making a baseboard, of white pine or poplar. The dimensions given in the sketch will do very well. The board should be planed and sandpapered smooth on the upper surface, and two cleats screwed to the lower surface, as shown, making the holes in the cleats large enough to permit the screws to fit loosely. The cleats will prevent the baseboard from warping. Then prepare the sides of the mold. For blocks 2 by 2 by 4 in., which will be a useful size to the youngster, cut two long pieces for the sides of the mold; seven shorter ones, to serve as partitions, and six spacers, to keep the partition blocks the proper distance apart. The molds can be fastened together with clamps, a good type for the purpose being shown at one end of the board. Two of these are sufficient, one at each end. Different sizes of blocks can then be made, merely by using spacers of different width and thickness. Variety can be given to the shape of the molds by placing triangular or quarter-round pieces in each corner, of the kind shown at the bottom of the sketch at the left. The pattern of these inserts can, of course, be modified according to the taste of the workman, but even the simpler kind will relieve plain blocks of their monotony, as shown at the lower right-hand corner of the sketch. Nothing more is necessary, except a coating of paraffin or shellac, to be laid on all parts of the board that will come in contact with the cement, so as to prevent it from sticking. Paraffin is preferable; if shellac is used, be careful to see that it is thoroughly dry before filling the molds.

Make the mixture of sea-beach, or creek sand, and cement, using one part of cement to two parts of sand. Add water enough to make a thick paste. If a reddish tone is desired, add ground-brick dust to the mixture, using one part of brick dust to two parts of cement and sand. When the material is in the molds, smooth the surface with a wet knife. Ornamental faces can be given to the blocks by pressing upon the top of the mixture while it is still soft, a butter-pat mold, scallop shell, or anything that will leave a clear impression. A more varied outline can be given to the blocks when the workman has become familiar with the materials. Let the blocks dry for several days before removing them from the molds. Trim the edges slightly with an old file, to remove the fur. The blocks will then be almost indestructible.

Why Shooting Downward Is Difficult

Hunters often notice that it is hard to hit game when shooting almost straight downward. The explanation is simple, and its understanding may help in making downhill shots.



A rifle sent from the factory is sighted to shoot accurately at 100 yd.; beyond that distance the sights must be further elevated. No rifle can shoot absolutely point-blank; this is impossible. A bullet drops, when moving through the air, just as many feet per second as when dropped from one's fingers to the floor. In shooting at 200 yd., the bullet must go several feet above the line of sighting in order to "carry up," and hit the target; that is, in order to compensate for the falling of the bullet in flight.

But suppose the muzzle of the gun points almost straight downward. In

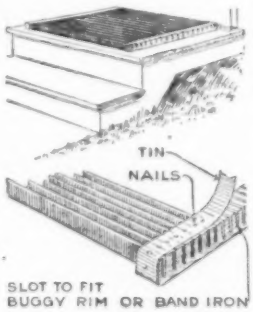
that case, the force of gravity tends only very little to pull the bullet down out of its course; hence an overshot results. A rifle is sighted to shoot in a horizontal position, and when it is turned downward, the ordinary use of the sights will cause the bullet to strike outside of the target. The remedy is in aiming "under" the target, when shooting down. The same is true for shooting upward.

Inner Tube Used over Bandage

A serious flesh wound in the arm of a child made several stitches necessary. For some time afterward the arm was kept in a bandage saturated with boric acid, and this caused considerable inconvenience, as the child's clothing constantly got wet—also the bed covering at night. His father overcame the difficulty by inclosing the bandage in a rubber sheath, made by cutting a 10-in. piece from an old inner tube, which was well washed and sterilized to prevent infection. A stout piece of wire was passed through the tube, and a loop was made at each end, to which a large handkerchief was fastened, passing over the child's shoulder to serve as a sling. The tube made a waterproof covering for the wet bandage, which gave no further trouble thereafter.—D. Welge, Mason, Nev.

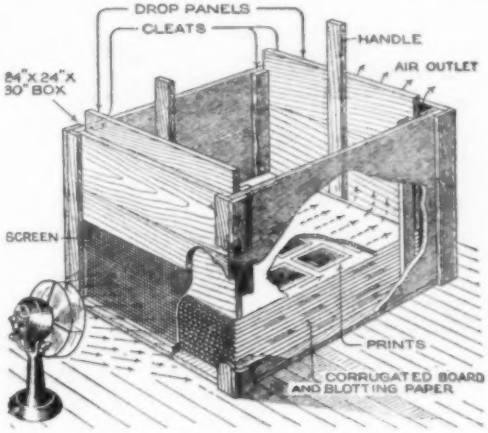
Foot Scraper Made from Scrap Iron

A foot scraper, or metal porch mat, is a great help toward keeping the house clean in rainy weather. If some old buggy rims or other iron strips are available, the mat can be built in a short time, as shown in the picture. Slots are cut in a square stick of wood, of such width and depth that the iron strips will be a fairly tight fit in them. Tin straps are put on with nails, to keep the iron strips from being forced up out of the slots. If one has a drill to make holes in the metal strips, it is well to put a nail through each end of the outer strips, so as to hold the scraper together. If the other strips are a fairly tight fit in the slots, no fastening will be necessary to hold them in position lengthwise.



A High-Capacity Print Drier

Where there are many photographic prints to be dried at one time, as in a commercial gallery, some means of doing the work quickly and well becomes a necessity.



A Simple Drier, Having a Capacity of Several Hundred Prints, Leaves the Print Flat, and Does the Work Rapidly

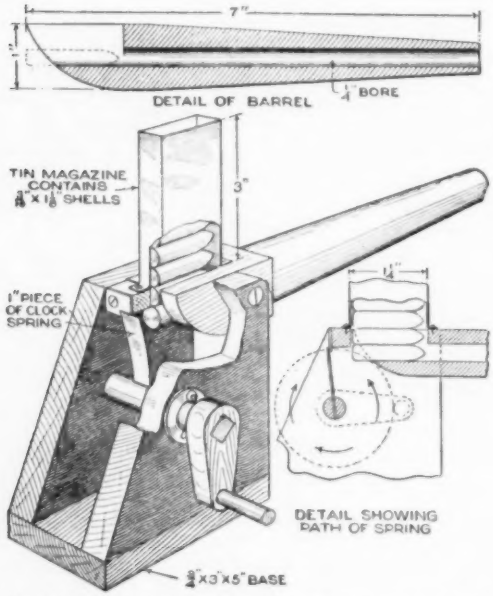
The box is made from ½-in. stock, or may be obtained from a store. A piece of screen is set into an opening cut in the lower half of one end. Cleats nailed to the sides of the box, ¾ in. from this end, permit the insertion of a drop panel made from ½-in. lumber and fitted with a cleat which serves as a handle. Two cleats on each side, at the other end of the box, make a groove into which another drop panel fits, but this panel is held 2 in. from the end of the box, leaving an air space.

To dry a number of prints, place a sheet of corrugated strawboard on the bottom of the box, then a sheet of blotting paper, upon which the prints are arranged, face up. A strip of muslin is placed on top of the prints, after which the layer process is continued until all the prints have been placed in the box. The stack is covered with a sheet of corrugated board, the panels are inserted, and the electric fan set in operation in the place indicated.

Such a device carries out the drying process rapidly, since a continuous stream of air circulates through the box, removing the moisture quickly. But the even more valuable features are the high capacity of the box, which holds hundreds of prints, and the fact that it dries them absolutely flat.—Dale R. Van Horn, Lincoln, Neb.

Toy Spring-Operated Machine Gun

A machine gun, firing wooden ammunition as fast as the crank can be turned, will attract the favorable attention of



As the Crank of This Machine Gun is Turned, the Wooden Bullets are Fired One by One by the Spring Until the Magazine Is Empty

nearly every boy. Such a gun, as shown in the drawing, can be made very easily, out of material which costs almost nothing.

The wooden gun barrel is turned down to size, and bored. A slot is cut near one end, reaching down to the bore, to allow the ammunition to drop from the magazine into the barrel. The underside of the barrel is rounded off, as shown, for the spring which must pass under from the rear. The barrel is then mounted between two wooden supports, attached to a base.

A piece of a stiff clock spring is fastened securely into a slot cut in the shaft, which is a round piece of hard wood. It is fastened by riveting a small brad through the wood, and through a small hole punched in the spring. The shaft is mounted just below the rear end of the gun barrel, so that the spring will slip against the lower "shell," after first catching on a projection left in the upper part of the barrel. When the crank on the shaft is turned, the spring strikes this projection, bends backward, then slips forward with a jerk which drives the wooden bullet forward with great force. The shaft is held at exactly the right point to keep the spring in place, by putting a cotter pin in each end of the shaft, with a washer between each cotter pin and the support, to keep the pin from cutting into the wood. The crank may be either a piece of sheet metal with a small bolt for a handle, or a piece of wood, with a wooden handle. The end of the shaft is cut square so that it will turn with the crank.

For a magazine, a piece of tin is bent and soldered into a shallow box, with open ends. At the lower end lugs are provided, to keep the magazine in place. The wooden bullets are slipped into the upper end of the magazine. When the crank is turned, the spring drives the bullets out one by one, a new bullet falling into place as the one before is fired.

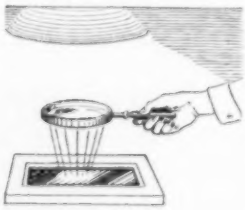
If well made, this machine gun should work rapidly, and should fire the bullets several yards, and with great force.—J. Horace Van Nice, Waukon, Ia.

Putting an Egg into a Bottle

An egg may be put into a bottle which has a mouth much smaller than the egg. First soak the egg in vinegar until the shell becomes soft and pliable. It will then be easy to force the egg into the bottle. Pour cold water into the bottle, and allow it to remain until the shell becomes hard again. The bottle can then be shown to friends, who are certain to be greatly mystified by the sight of an egg in such a place.

Printing Up Uneven Negatives

A valuable negative may have a light or faded spot in a prominent portion that destroys the beauty of the print to a great extent. Strengthening the light on this spot while printing will often remove this defect.



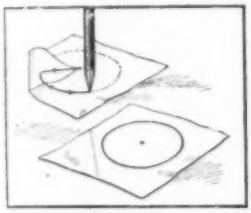
This can be accomplished by using a large reading glass to concentrate the light on the desired spot. The glass should be held between the light and the printing frame, moving the glass up and down to prevent the formation of a dark spot. At no time, however, should the light be brought to a sharp focus.—Thos. W. Benson, Philadelphia, Pa.

Tightening Tobacco-Pipe Stem

When a tobacco pipe has a hard-rubber stem which fits too loosely into the bowl, a snug fit can be made by heating the end of the stem slightly, so as to soften it. The stem can then be expanded by pressure against the end. It is advisable, while expanding the stem with one hand, to pour water on it with the other, when the desired diameter is reached. If the stem is made too large, it can be sandpapered or filed down to the right size.

The Dot in the Circle

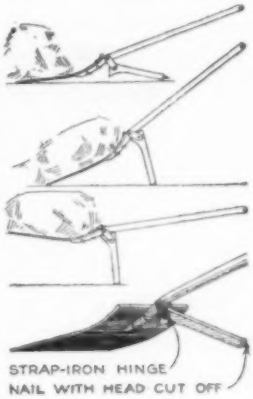
Ask some one to draw a circle with a dot in the center of it—or near the center—without any line joining the dot and the circle, and yet without taking the pencil from the paper. This trick sounds impossible, but is very simple when the solution is explained.



Turn over a corner of the paper, and make a dot near the point of this same corner, on the body of the sheet. Run the pencil up the turned-over corner a short distance and begin to draw the circle, as indicated. When the pencil reaches the surface of the paper on which the dot is, turn back the corner and complete the circumference around the dot on the paper, as a center.

Fulcrum Attachment for Snow Shovel

Lifting heavy loads of snow from the walk becomes tiresome very quickly. The foot shown in the drawing prevents backache, by lessening the tiresome stoop and the straight lift of the heavy load.



The foot is a piece of hard wood, 15 in. long, 4 in. wide at the top, and tapering toward the bottom, where a headless nail is set, extending about ½ in. Two small straps of iron, one on each side of the foot and the shovel handle, serve as hinges. Thus the foot swings back away from the rear of the shovel easily, but projects at right angles from the shovel blade when the handle is vertical.

Push the shovel under a load of snow; raise the handle, kick the foot forward, and push the handle down, pulling back on it enough to prevent the foot from folding. The shovel load is thus brought up within easy reaching distance, where a side swing sends the snow off to the side.

¶ Casters will not drop out of chair legs if the holes are filled with melted paraffin just before the casters are put in.

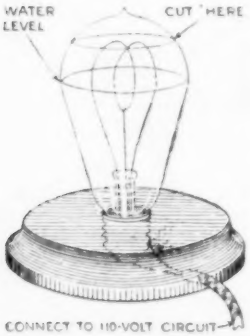
A Simple Table Extension

An extension leaf which greatly increases the capacity of a table, can be so made as to permit quick attachment or removal. A board of the same material as the table top is cut long enough to fit across the end of the table. Two strips, 3 in. wide, 3 ft. long, and ⅞ in. thick, are screwed to the underside of the leaf, near the center, and about 18 in. apart. These strips slip through notches cut for them in the framework around the table legs. The notches must be a close fit so that the leaf will be held level with the table top. The leaf is carefully sandpapered, and the corners rounded. The wood is then finished to match the finish of the table. If the work is properly done, the leaf is readily adjusted or removed, stays firmly in place, and is as satisfactory as the table top itself. Other leaves may be added at end or side, thus making it possible to almost double the size of the table.

An Extension Leaf, Which Adds to the Effective Size of the Table, is So Constructed That It can be Quickly Removed

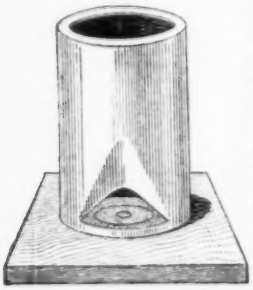
Water Heater Made from Lamp Globe

A handy heater, which can warm quickly small quantities of water, such as may be required for shaving, is readily made from an ordinary 16-cp. carbon electric lamp. The upper part of the globe is cut off by the use of a three-cornered file, or some other means, and the base of the lamp is mounted in a broad wooden base. Connection is made from the contact surfaces of the lamp, to wires leading to the 110-volt lighting circuit. In use, the globe is filled with water to about 1½ in. from the upper end of the filament. When the current is turned on, nearly all of the heat developed goes to heat the water, and this is accomplished in a very short time, without requiring any attention.—George MacLean, Robertsonville, Quebec, Can.



Tin-Can Chicken Feeder

A convenient chicken or rabbit feeder, that will hold a continuous supply the animals cannot soil, is easily made from a tin can. Simply cut out the top of the can smoothly and make a cut in the side, ½ in. from the bottom, extending a fourth of the circumference. Bend in the cut side, so as to form a small recess. Grain poured into the top of the can will run out into this recess so that the animals can feed, but it will not overflow the half-inch edge. Be careful to smooth all the edges, so that the animals cannot injure themselves in feeding. For large flocks, where it is desirable to feed several at once, use the large 1-gal.-size cans, and cut several recesses. If large, square cans are used they can be cut at all four corners. Covers which will protect the feed during bad weather may be made of wood or galvanized iron.—Doncaster G. Humm, Upland, California.

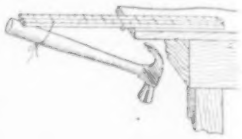


To Make Artificial Moonlight

Moonlight effects are often wanted for entertainments and plays, but are very difficult to produce on the stage. An exceedingly close imitation may be made by use of an electric arc lamp, with copper electrodes instead of the usual carbon. These copper electrodes are cut from ½-in. copper rod. With a current of from five to ten amperes they will not overheat, and will produce a light of the right color, with well-defined shadows that simulate actual moonlight. The arc requires but very little attention.—K. M. Bard, Manawa, Wis.

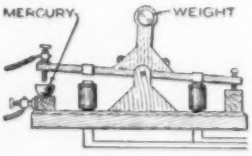
The Rule-and-Hammer Trick

Lay an ordinary 2-ft. folding rule, half opened, on the table; push it to the edge of the table so that half of the rule falls and hangs vertical. Lift this hanging end to a horizontal position, and challenge somebody to hang a hammer on this end so that it will not fall. This will sound absurd unless one happens to think of the solution. After the victim has been sufficiently bewildered by the declaration that the job is easy, it will not be difficult to attach the hammer as shown, so that it will hold its position. The experiment should first be tried in private, so that the performer can familiarize himself with the exact position at which the hammer will have to be tied.——F. H. Sweet, Waynesboro, Va.



Relay Switch with Mercury Contact

Circuits under pressure up to 110 volts, or more, may be opened or closed from a distance by means of the relay switch illustrated. A wooden lever, 8 or 10 in. long, is pivoted between two uprights fastened to a wooden base. Two small pieces of soft iron, secured halfway between the pivot and the ends of the lever, serve as armatures for the two magnets mounted on the base. A binding-post screw, in one end of the lever, makes contact with a cup containing mercury, which is placed on the base directly under the lever. A



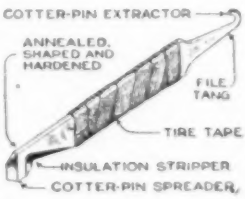
battery-control circuit is provided with a two-point switch, so that either of the magnets may be energized separately, by throwing the switch arm to one side or the other. When the magnet on the side of the lever which carries the binding-post contact is in the circuit, the magnet pulls the armature down, thus causing the binding-post screw to make connection with the mercury in the cup. The contact and cup are connected as a switch in the high-voltage circuit. When the other magnet is connected, the lever is pulled the other way, thus breaking the circuit. To hold it in position when the low-voltage current is off, a weight is fixed above the lever. This saves battery current by automatically holding the lever to whichever side it is thrown.—R. C. Hitchcock, Middletown, Conn.

Erasing Shield from Old Film

A very good draftsman's erasing shield can be made from a piece of photographic film. The emulsion is removed by boiling, thus leaving the film entirely transparent. After cutting the film to about 2 by 4 in. in size, ovals, circles, and rectangles of various sizes are cut in it with a very sharp knife, or a razor blade. This makes a shield that can be held over the work, without preventing the draftsman from seeing the lines on the drawing. The best type of film to use is the so-called "portrait film," which is heavier than other grades.

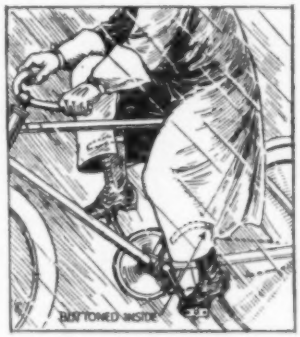
Combination Tool Made from File

As the steel used in files is of high quality, it is preferable not to throw them away after the cutting faces have worn to such a degree that they can no longer be used for filing. Old files can be used for small chisels, scribers, center punches, etc. The tool illustrated, for extracting cotter pins and setting them in place, and for stripping the insulation from electric wire, was made by an automobile mechanic from a discarded file. The steel was annealed by being heated and cooled slowly, and was then shaped as shown in the sketch. It was tempered by being heated to a cherry-red and plunged in oil, after which the center was wrapped with tape to form a handle.



Cyclist's Raincoat Attachment

A man who had occasion to ride a bicycle quite often in the rain, found it a comfortable practice to mount straps on the lower corners of his raincoat, as indicated. These straps, when fastened around the leg, prevent the coat from swinging clear of the legs, and thus afford a much better protection from the rain or snow.—Wayne W. Leyrer, Atlantic City, New Jersey.



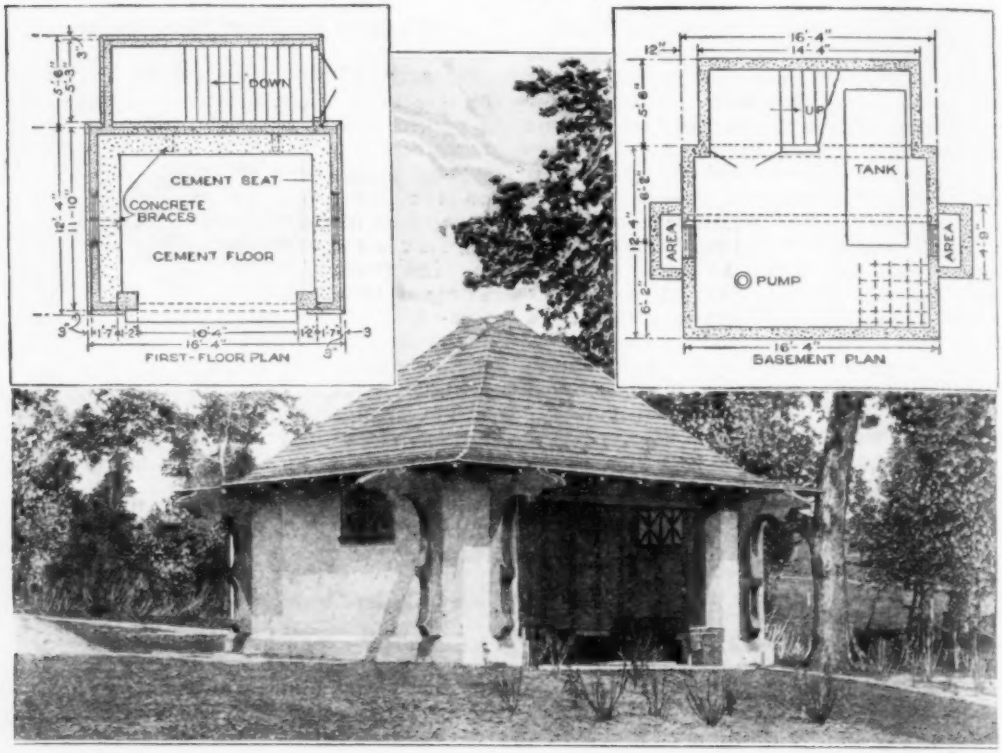
Corks Prevent Heel Slipping

A leather heel which has worn smooth may be prevented from slipping on floor or carpet by inserting corks, or other nonslip material, into holes drilled in the heel. Three ½-in. holes, drilled in the leather to a depth of from ⅜ to ½ in., will be sufficient. Ordinary corks, rubber stoppers, or rubber plugs cut from old automobile casings, will be good, but the plugs from old casings wear longest. The material must be larger than the holes in the heel, so that it is forced in, and so that it projects slightly beyond the surface of the leather. When one set of plugs is worn out, another may be inserted.—Forrest Benson, Boulder, Colo.

Wire Stand for Paper Drinking Cups

A single piece of stiff brass or nickel-plated wire, bent as shown in the sketch, makes a neat and attractive holder for individual paper containers, used for ice cream and drinks. A holder of this design is sanitary and inexpensive, and is not subject to damage by dropping on the floor, as it readily springs back into the proper shape.—Elmer S. Tetzloff, Chicago, Ill.

PRETTY SHELTER HOUSE IS PUMPING PLANT TOO



BALCH & LIPPERT, ARCHITECTS

Bus-Line Waiting Station of Stuccoed Concrete, with Shingle Roof and Cypress Cornice Brackets of Distinctive Shape: Left-Hand Floor Plan Shows Waiting-Room Arrangement, with Cement Bench around Walls, and Location of Stairway. Right-Hand Plan Indicates Arrangement of Pump and Tank in Basement

A PRETTY residence suburb on a bus line running out of a college town in southern Wisconsin is marked by a waiting station of unusual character. Its interest lies not only in its attractiveness and the satisfactory way in which it meets its more obvious purpose, but also in a highly important function which it performs without any external evidence whatsoever. For the basement of the little shelter house is a full-fledged pumping station, with an automatic electric pump, serving water at 95-lb. pressure from a 100-ft. well to the homes of the neighborhood, and a 4 by 10-ft. concrete reserve tank.

The over-all dimensions of the building are 16 ft. 4 in. wide and 17 ft. 10 in. deep. The rear portion, however, is occupied by a stairway to the basement, which is entered from the outside and has no connection with the waiting room. The latter measures 13 by 15 ft., with the front open to a width of 10 ft. 4 in. The floor is a reinforced-concrete slab, 6 in. thick, and a cement seat, built upon the top of the foundation wall, runs entirely around the three sides of the room. The basement pump room is finished wholly in concrete. The stucco waiting-room walls are paneled with wood strips, and high windows in the sides are latticed but not glazed, being protected by the deep cornice.

Outside, the wall is finished in rough, gray stucco on galvanized metal lath. At each outside corner of the building two heavy wood cornice brackets of peculiar shape give distinction to the whole structure. All woodwork is of cypress, with two coats of brown paint, the last coat sanded before it was dry. The little depot cost only a few hundred dollars, and could easily be adapted to any location.

IN accordance with the editorial policy of this magazine never to accept compensation in any form for what appears in our reading pages, and also to avoid all appearance of doing so, we are obliged to omit the name of the maker or the seller of any article described. This information, however, is kept on file and will be furnished free, by addressing Bureau of Information, Popular Mechanics Magazine, Chicago. [Editor.]

A Christmas Message from the World's Greatest Artists
TO EVERY LOVER OF BEAUTIFUL MUSIC THE GREAT ARTISTS WHOSE NAMES APPEAR BELOW SEND THEIR WARM CHRISTMAS GREETINGS. THEY CANNOT BE WITH YOU ON CHRISTMAS DAY BUT THEY CAN VISIT YOU THROUGH THE VICTROLA—THEIR "OTHER SELF." THEIR SONG, THEIR ART, THEIR LAUGHTER CAN HELP TO MAKE YOUR DAY HAPPIER AND REMAIN THROUGHOUT THE YEAR TO CHEER AND ENTERTAIN YOU.
MANY MUSIC-LOVERS ARE JUST NOW CONSIDERING THE PURCHASE OF AN INSTRUMENT FOR CHRISTMAS. THEY ARE URGED AND ADVISED BY THESE ARTISTS TO BUY THE VICTROLA. THESE ARTISTS MAKE VICTROLA RECORDS EXCLUSIVELY BECAUSE THEY BELIEVE THEM TO BE THE MOST FAITHFUL AND THE MOST BEAUTIFUL IN THE WORLD. THEY BELIEVE THAT THE VICTROLA WITH ITS PURE EXQUISITE TONE IS THE ONLY TRUE AND ADEQUATE INSTRUMENT FOR REPRODUCING THEIR ART.
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BRASLAU
CALVÉ
CARUSO
DE GOGORZA
DE LUCA
ELMAN
FARRAR
GALLI-CURCI
GARRISON
GLUCK
HEIFETZ
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KREISLER
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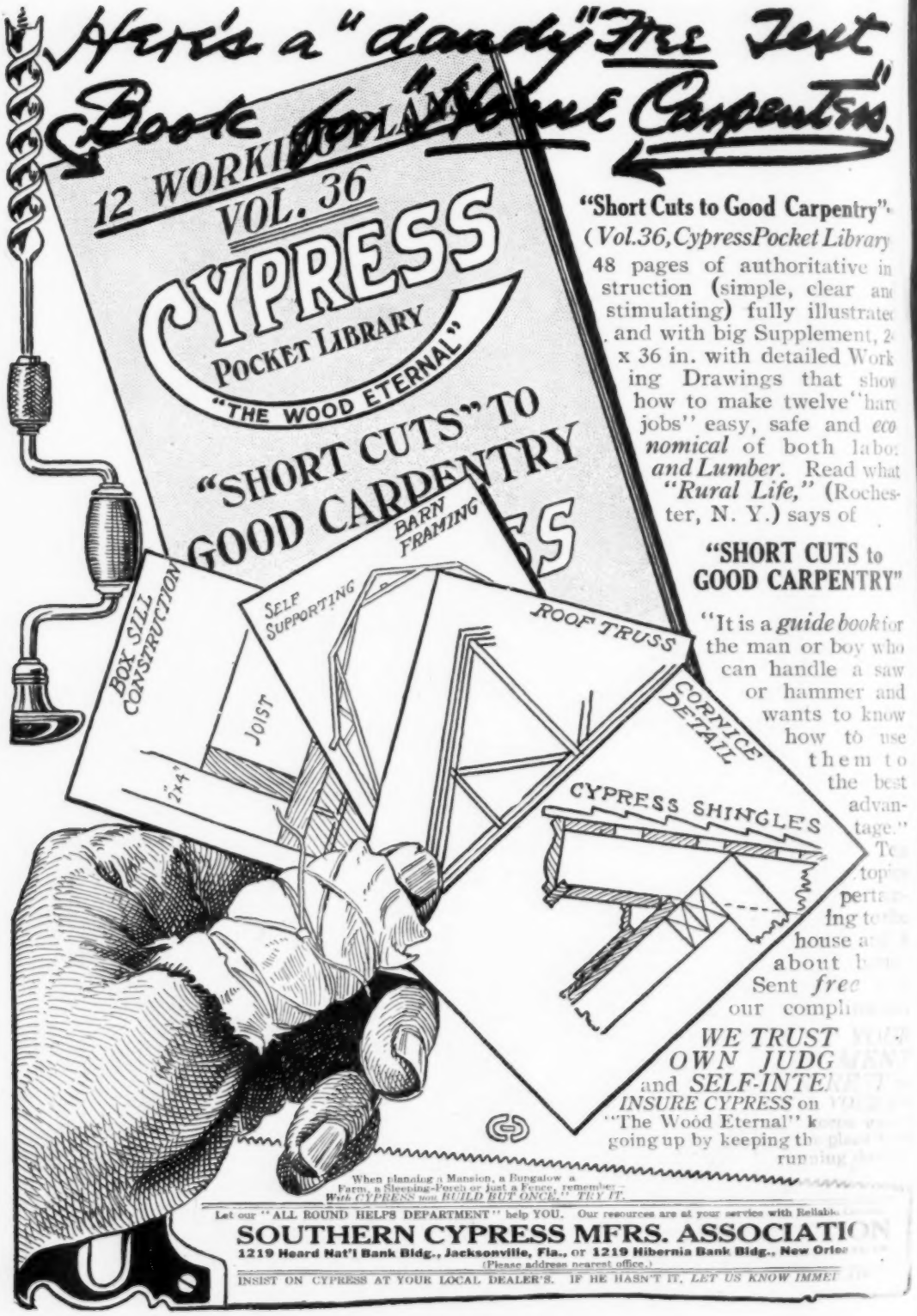

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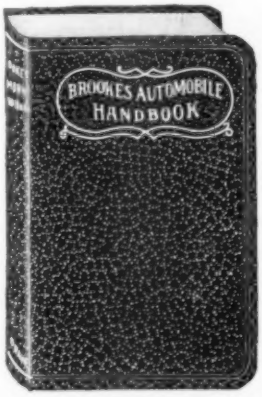

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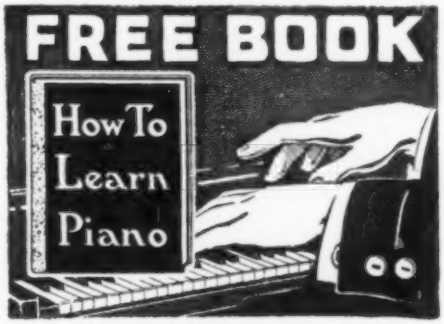

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ALL the office was talking about it, and we were wondering which one of us would be the lucky man.

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The main requisite, as we understood it, was striking personality and the ability to meet even the biggest men in their offices, their clubs and their homes on a basis of absolute equality. This the firm considered of even more importance than knowledge of the business.

You know just what happens when news of this sort gets around an office. The boys got to picking the man among themselves. They had the choice all narrowed down to two men—Harrison and myself. That was the way I felt about it, too. Harrison was big enough for the job, and could undoubtedly make a success of it. But, personally, I felt that I had the edge on him in lots of ways. And I was sure that the firm knew it, too.

Never shall I forget my thrill of pleasure when the president's secretary came into my office with a cheery smile, looked at me meaningly, handed me a bulletin and said, "Mr. Frazer, here is the news about the new Assistant-to-the-President." There seemed to be a new note of added respect in her attitude toward me. I smiled my appreciation as she left my desk.

At last I had come into my own! Never did the sun shine so brightly as on that morning, and never did it seem so good to be alive! These were my thoughts as I gazed out of the window, seeing not the hurrying throngs, but vivid pictures of my new position flashing before me. And then for a further joyous thrill I read the bulletin. It said, "Effective January 1, Mr. Henry J. Peters, of our Cleveland office, will assume the duties of Assistant-to-the-President at the home office."

PETERS! Peters!—surely it *couldn't* be Peters! why, this fellow Peters was only a branch-office salesman . . . *Personality!* Why, he was only five feet four inches high, and had no more personality than a mouse. Stack him up against a big man and he'd look and act like an office boy. I knew Peters well and there was nothing in him, nothing at all.

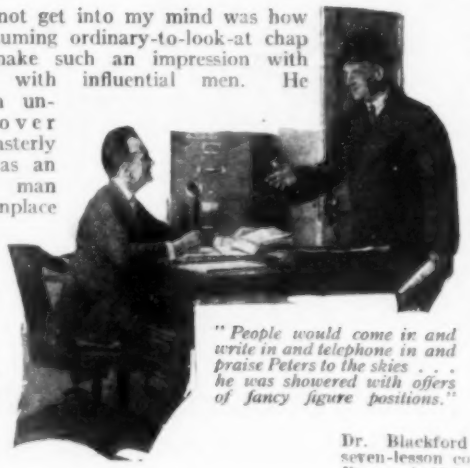
January the first came and Peters assumed his new duties. All the boys were openly hostile to him. Naturally, I felt very keenly about it, and didn't exactly go out of my way to make things pleasant for him—not exactly!

But our opposition didn't seem to bother Peters. He went right on with his work and began to make good. Soon I noticed that, despite my feeling against him, I was secretly beginning to admire him. He was winning over the other boys, too. It wasn't long before we all buried our little hatchets and palled up with Peters.

The funny thing about it was the big hit he made with the people we did business with. I never saw anything like it. They would come in

and write in and telephone in to the firm and praise Peters to the skies. They insisted on doing business with him, and gave him orders of a size that made us dizzy to look at. And offers of positions!—why, Peters had almost as many fancy-figure positions offered to him as a dictionary has words.

WHAT I could not get into my mind was how a little, unassuming ordinary-to-look-at chap like Peters could make such an impression with everyone—especially with influential men. He seemed to have an uncanny influence over people. The masterly Peters of to-day was an altogether different man from the commonplace Peters I had first met years ago. I could not figure it out, nor could the other boys.



"People would come in and write in and telephone in and praise Peters to the skies . . . he was showered with offers of fancy figure positions."

One day at luncheon I came right out and asked Peters how he did it. I half expected him to evade. But he didn't. He let me in on the secret. He said he was not afraid to do it because there was always plenty of room at the top.

What Peters told me acted on my mind in exactly the same way as when you stand on a hill and look through binocular glasses at objects in the far distance. Many things I could not see before suddenly leaped into my mind with startling clearness. A new sense of power surged through me. And I felt the urge to put it into action.

Within a month I was getting remarkable results. *I had suddenly become popular.* Business men of importance who had formerly given me only a passing nod of acquaintance, suddenly showed a desire for my friendship. I was invited into the most select social circles. People—even strangers—actually went out of their way to do things for me. At first I was astounded at my new power over men and women. Not only could I get them to do what I wanted them to do, but they actually anticipated my wishes and seemed eager to *please me.*

I COULD tell you dozens of similar instances, but they all tell the same story—the ability to make people like you, believe what you want them to believe, and to do what you want them to do. I take no personal credit for what I have done. All the credit I give to the method Peters told me about. We have told it to lots of our friends, and it has enabled them to do just as remarkable things as Peters and I have done.

Which reminds me: One of my wife's close friends moved to another town where she was a stranger. My wife of course knew of my method. She told it to her friend with the idea that it might be of assistance to her in meeting new people. It helped her so wonderfully that in a very short time she won the close friendship of many of the "best families" in the town. Everyone wonders how she did it. But WE know.

WHAT Peters told me at luncheon that day was this: "Get Dr. Blackford's 'Reading Character at Sight.'" I did so. This is how I learned to do all the remarkable things I have told you about.

You have heard of Dr. Blackford the Master Character Analyst. Many concerns will not employ a man without first getting Dr. Blackford to pass on him. Concerns such as Westinghouse Electric and Manufacturing Company, Baker-Vawter Company, Scott Paper Company, and many others pay Dr. Blackford large annual fees for advice on dealing with human nature.

So great was the demand for these services that Dr. Blackford could not even begin to fill all the engagements. So Dr. Blackford has explained the method in a simple seven-lesson course entitled "Reading Character at Sight." Even a half hour's reading of this remarkable course will give you an insight into human nature and a power over people which will surprise you.

Such confidence have the publishers in Dr. Blackford's Course, "Reading Character at Sight," that they will gladly send it to you on approval. Send no money. Merely fill in and mail the coupon. The complete course will go to you instantly, on approval, all charges prepaid. Look it over thoroughly. See if it lives up to the claims made for it. If you do not want to keep it, then return it, and the transaction is closed. And if you decide to keep it—as you surely will—then merely remit Five Dollars in full payment.

Remember, you take no risk, you assume no obligation. The entire course goes to you on approval. You've everything to gain—nothing to lose. So mail the coupon NOW, while this remarkable offer remains open.

"In a very short time she won the close friendship of many of the 'best families' in town"

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Five Days to Prove I Can Raise Your Pay

I've done it for thousands of others. I can doubtless do it for you. If I can't, then it won't cost you a cent

I MEAN just what I say. There's no trick or catch about it. Give me five days and I'll prove that I can get your pay raised for you. I'll do it on a "show you" basis. You get the proof before you pay me a cent.

You've probably heard of me. My name is Pelton. Lots of people call me "The Man Who Makes Men Rich." I don't deny it. I've done it for thousands of people—lifted them up from poverty to riches. There's no sound reason why I cannot do it for you. So let's try.

Now, follow me carefully. I'm going to tell you exactly how to do it. I'm the possessor of a "secret" for which men have been searching since Time began.

There's no need to discuss the whys and the wherefores of this "secret." Suffice it to say that *It Works*. That's all we care about—*It Works*. Over 350,000 men and women the world over have proved it for themselves.

Among them are such men as Judge Ben B. Lindsay; Supreme Court Justice Parker; Lieut. Governor McKelvie of Nebraska; Wu Ting Fang, ex-U. S. Chinese Ambassador; Governor Ferris of Michigan, and thousands of others of equal prominence.

Some of the things this "secret" has done for people are astounding. I would hardly believe them if I hadn't seen them with my own eyes. Adding ten, twenty, thirty or forty dollars a week to a man's income is a mere nothing. That's merely playing at it. Listen to this:

A young man in the East had an article for which there was a nation-wide demand. For twelve years he "puttered around" with it—barely eking out a living. Today this young man is worth $200,000. He is building a $25,000 home—and paying cash for it. He has three automobiles. His children go to private schools. He goes hunting, fishing, traveling whenever the mood strikes him. His income is over a thousand dollars a week.

In a little town in New York lives a man who two years ago was pitied by all who knew him. From the time he was 14 he had worked and slaved—and at sixty he was looked upon as a failure. Without work, in debt to his charitable friends, with an invalid son to support, the outlook was pitchy black.

Then he learned the "secret." In two weeks he was in business for himself. In three months his plant was working night and day to fill orders. During 1916 the profits were $20,000. During 1917 the profits ran close to $40,000. And this genial 64-year-young man is enjoying pleasures and comforts he little dreamed would ever be his.

I could tell you thousands of similar instances. But there's no need to do this as I'm willing to tell you the "secret" itself. Then you can

put it to work and see what it will do for you. I don't claim I can make you rich over night. Maybe I can—maybe I can't. Sometimes I have failures—everyone has. But I do claim that I can help 90 out of every 100 people if they will let me.

The point of it all, my friend, is that you are using only about one-tenth of that wonderful brain of yours. That's why you haven't won greater success. Throw the unused nine-tenths of your brain into action and you'll be amazed at the almost instantaneous results.

The Will is the motive power of the brain. Without a highly trained, inflexible will, a man has about as much chance of attaining success in life as a railway engine has of crossing the continent without steam. The biggest ideas have no value without will-power to "put them over." Yet the will, although heretofore entirely neglected, can be trained into wonderful power like the brain or memory and by the very same method—intelligent exercise and use.

If you held your arm in a sling for two years, it would become powerless to lift a feather, from lack of use. The same is true of the Will—it becomes useless from lack of practice. Because we don't use our Wills—because we continually bow to circumstance—we become unable to assert ourselves. What our wills need is practice.

Develop your will-power and money will flow in on you. Rich opportunities will open up for you. Driving energy you never dreamed you had will manifest itself. You will thrill with a new power—a power that nothing can resist. You'll have an influence over people that you never thought possible. Success—in whatever form you want it—will come as easy as failure came before. And those are only a few of the things the "secret" will do for you. The "secret" is fully explained in the wonderful book "Power of Will."

A Few Examples

Personal Experiences

Among over 350,000 users of "Power of Will" are such men as Judge Ben B. Lindsay; Supreme Court Justice Parker; Wu Ting Fang, Ex. U. S. Chinese Ambassador; Assistant Postmaster General Britt; Lieut. Gov. McKelvie of Nebraska; General Manager Christeson of Wells-Fargo Express Co.; E. St. Elmo Lewis of Detroit; Gov. Ferris of Michigan, and many others of equal prominence.

$300 Profit from One Day's Reading

"The result from one day's study netted me $300 cash. I think it a great book and would not be without it for ten times the cost."—A. W. Wilkie, Faulkton, So. Dakota.

Worth $15,000 and More

"The book has been worth more than $15,000 to me."—Oscar B. Sheppard, 1117 E. Locust St., Decatur, Ill.

Would be Worth $100,000

"If I had only had it when I was 20 years old, I would be worth $100,000 to-day. It is worth a hundred times the price."—S. W. Taylor, The Santa Fe Ry., Milano, Tex.

Salary Jumped from $150 to $800

"Since I read 'Power of Will' my salary has jumped from $150 to $800 a month."—J. F. Gibson, San Diego, Cal.

From $100 to $3,000 a Month

"One of our boys who read 'Power of Will' before he came over here jumped from $100 a month to $3,000 the first month, and won a $250 prize for the best salesmanship in the state."—Private Leslie A. Still, A. E. F., France.

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I know you'll think that I've claimed a lot. Perhaps you think there must be a catch somewhere. But here is my offer. You can easily make thousands—you can't lose a penny.

Send no money—no, not a cent. Merely clip the coupon and mail it to me. By return mail you'll receive, not a pamphlet, but the whole "secret" told in this wonderful book, "POWER OF WILL."

Keep it five days. Look it over in your home. Apply some of its simple teachings. If it doesn't show you how you can increase your income many times over—just as it has for thousands of others—mail the book back. You will be out nothing.

But if you do feel that "POWER OF WILL" will do for you what it has done for over a quarter of a million others—if you feel as they do that it's the next greatest book to the Bible—send me only $3.50 and you and I'll be square.

If you pass this offer by, I'll be out only the small profit on a three and a half-dollar sale. But you—you may easily be out the difference between what you're making now and an income several times as great. So you see you've a lot—a whole lot—more to lose than I.

Mail the coupon or write a letter now—you may never read this offer again.

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A NEW World You Have Never Seen!

HAVE you seen the world as it looks today? The old world no longer exists—it has been completely made over—vast changes have taken place in every quarter of the globe. Today we are living in a NEW world!

The greatest war in history has turned the whole world upside down. It has wiped out our former maps—it has altered the face of continents, changed the status of territories everywhere—it has upset the entire world situation.

Important New Changes Everywhere

Besides the war, there have been other epoch-making forces at work revising the map of the world. Recent explorations, unprecedented expansion in commerce and industry, political upheavals—all have left their marks in every part of the globe.

How much do you know of this New World you are living in? Probably you have seen fragmentary maps in newspapers and magazines showing some one portion of the map that has been affected, but have you ever had the whole new world of today laid before your eyes so that you get a clear, comprehensive conception of just what changes have taken place?

Do you know what has been added to our geographical knowledge of the world by the recent explorations of Stefansson, Stuck, and McMillan in the Arctic, of Smuts in Africa, of Roosevelt and Rondo in Brazil?

Do you know how commerce has opened new routes of communication, built great new railroads in Alaska, Australia, Africa, Asia, South America?

Do you know how many new industrial cities have sprung up as a result of shipbuilding in the United States?

Do you know where the new kingdom of Hejaz and the new empire of Mongolia are located?

Do you know the new Europe that has come out of the war—with all the changes in boundaries, the new nations that have been born, the internationalized cities, the territories that are under plebiscites?

Do you know how the Peace Treaties have affected Africa, Asia, the islands of the Pacific?

Do you know what is included in the territory of over a million square miles which was taken from Germany and how it was disposed of by the Allies?

The New Strap on Italy's Boot

THERE is a new strap on Italy's boot as a result of the war. The northern boundary has been extended to strengthen the natural frontier—important readjustments have been made on the Dalmatian coast. Yet your present atlas does not show these vital changes. And this is only one example of the many vast alterations that have completely changed the map of every part of the world. You might better have no atlas at all than one that is full of misinformation. But this is the last time you need ever discard an out-of-date atlas, for now a *new kind* of atlas is ready for you—The NEW WORLD Loose-Leaf ATLAS—up-to-date *now* and *always*.

The Whole World Re-Mapped

Abreast of this great new world order comes a new kind of atlas—an atlas that keeps pace with the world! The NEW WORLD Loose-Leaf ATLAS is now ready—a superb new collection of maps that lays before you, in great detail, the whole new world of today.

But this is more than a *new* atlas—more than an *up-to-date* atlas—it is an atlas that can be *kept* up-to-date—that shows changes in the map whenever and wherever they occur, for with this atlas is furnished up-to-date *Map Service* that keeps abreast of current events.

A Few of the Many Features

Three hundred and seventy-six pages of maps and indexes. All maps are printed in full color on heavy, supercalendared paper, size of page 13¼ by 19½ inches. Rich, durable cover with special Loose-Leaf Binder. New maps of all the nations, territories, and islands of the world revised to date. Detail maps of important cities and harbors. Maps of the Hemispheres and the World. Exploration maps of North and South Poles. Language map of Europe. Large-scale map of the Western Front. Sixteen pages of Historical maps showing the territorial development of the nations of the world from ancient times. A comprehensive collection of special maps, including Physical, Vegetation, Climate, Population, Economic, and Agricultural maps. Large-scale maps of the United States. United States Railroad maps and key map showing standard time zones, parcel-post units. U. S. shipbuilding map. Oil and gas map. Over one hundred pages of new State maps, showing each State on large scale and in great detail. A complete index of the world, the index of the United States including the name of every incorporated place, post office, and town of over one hundred inhabitants, with latest population figures.

A Wonderful New Kind of Atlas

If the world never changed, no atlas would ever grow out-of-date. But with the rapid march of current events even new atlases must soon become obsolete. The NEW WORLD Loose-Leaf Atlas is the only atlas that keeps pace with the world, because we made it

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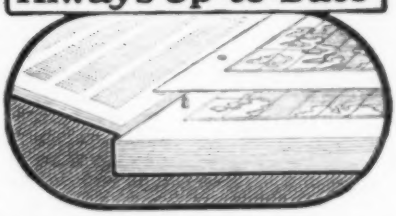

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The New World Loose-Leaf Atlas represents a distinct advance in the science of atlas production. Never before has an atlas been made that could be kept up-to-date. Never before has the loose-leaf principle been applied to an atlas.

The NEW-WORLD Loose Leaf ATLAS

It is the only method by which atlases can be kept permanently abreast of developments, of changes political and economic, of advances in commerce, of new discoveries and explorations.

World to Undergo Many Changes

Even now after all the changes that have taken place in every part of the globe, an atlas cannot be kept up-to-date unless provision is made for future changes.

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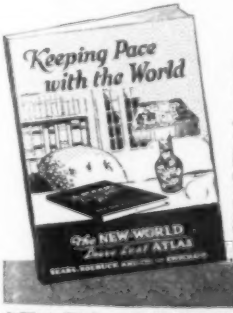

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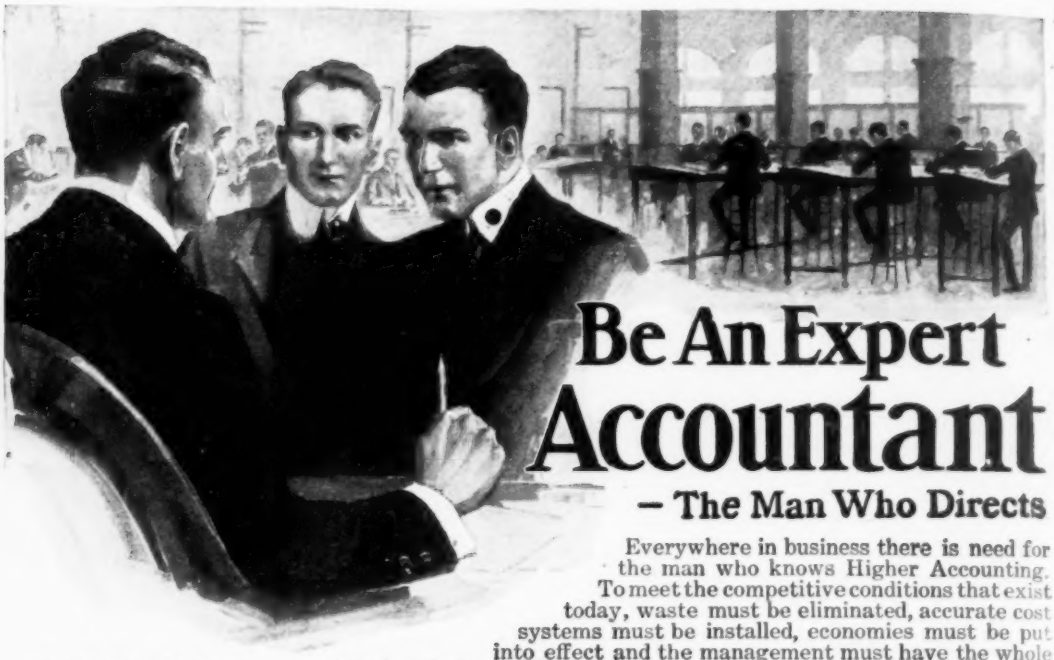

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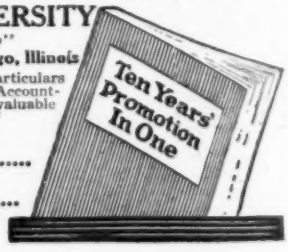

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Revolution

The name of Jean Paul Marat will forever be associated with the Reign of Terror during the French Revolution. It was out of this period that the empire was born, dominated and ruled by Napoleon. Again throughout the world thrones tremble and empires totter following the Great World War. Shall Russia survive or will red-handed terrorists again force the people to institute a monarchy to insure stable government. How else are we to judge of the momentous questions confronting the whole world except from the lessons of the past?

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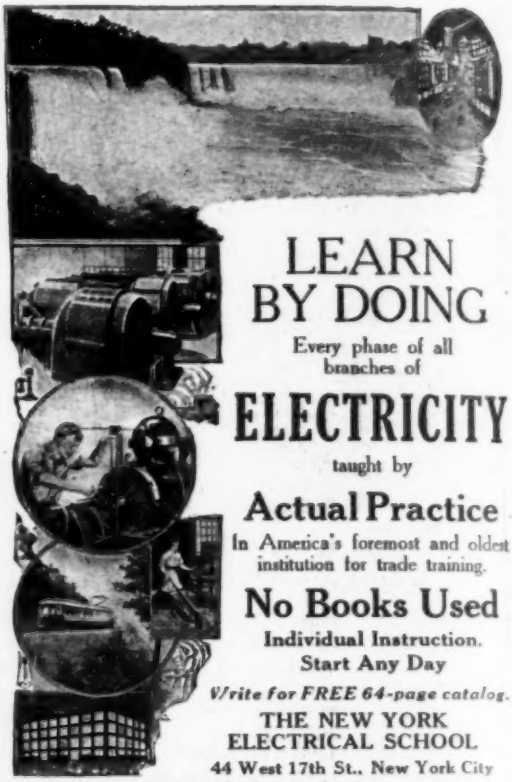

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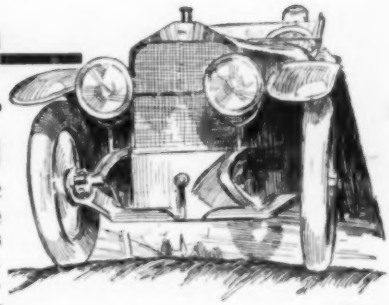

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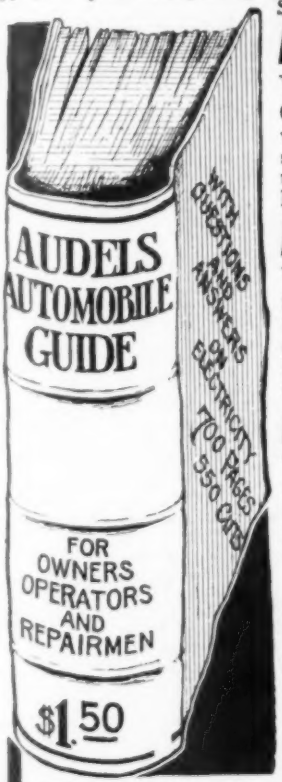

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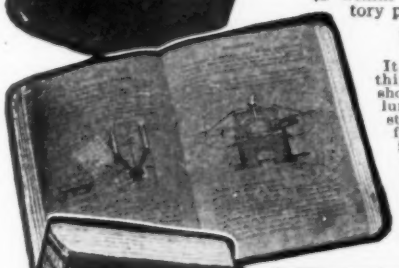

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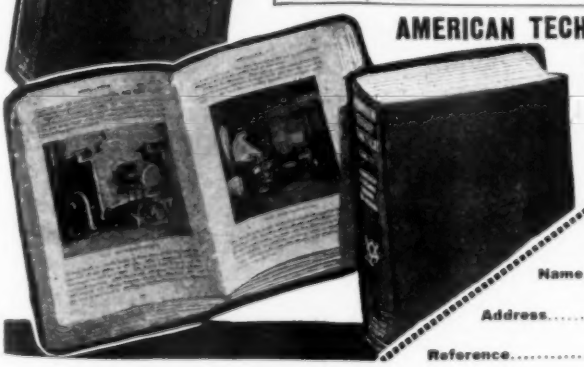

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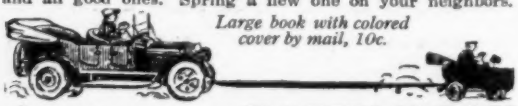

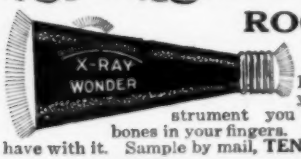

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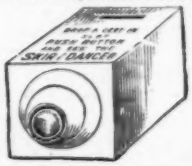

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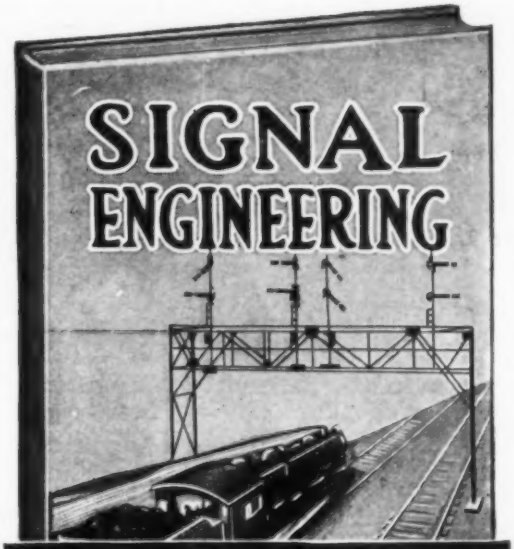

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"I'm to be Manager of my Department starting Monday. The boss said he had been watching all the men. When he found I had been studying at home with the International Correspondence Schools he knew I had the right stuff in me. Now we can move over to that house on Oakland Avenue and you can have a maid and take things easy. I tell you, Nell, taking that course with the I. C. S. was the best thing I ever did."

Spare-time study with the I. C. S. is winning promotions for thousands of men and bringing happiness to thousands of homes all over the world. In offices, shops, stores, mines, mills and on railroads, I. C. S. trained men are stepping up to big jobs, over the heads of older men, past those whose only qualification is long service.

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Some man is going to be picked for it. The boss can't take chances. He is going to choose a trained man with sound, practical knowledge of the work.

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Explain, without obligating me, how I can qualify for the position, or in the subject, *before* which I mark X.

- ☐ ELECTRICAL ENGINEER
- ☐ Electric Lighting and Railways
- ☐ Electric Wiring
- ☐ Telegraph Engineer
- ☐ Telephone Work
- ☐ MECHANICAL ENGINEER
- ☐ Mechanical Draftsman
- ☐ Machine Shop Practice
- ☐ Toolmaker
- ☐ Gas Engine Operating
- ☐ CIVIL ENGINEER
- ☐ Surveying and Mapping
- ☐ MINE FOREMAN OR ENGINEER
- ☐ STATIONARY ENGINEER
- ☐ Marine Engineer
- ☐ Ship Draftsman
- ☐ ARCHITECT
- ☐ Contractor and Builder
- ☐ Architectural Draftsman
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- ☐ CIVIL SERVICE
- ☐ Railway Mail Clerk
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- ☐ Navigation
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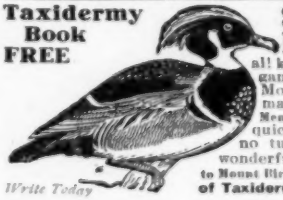

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What Will YOU Be—An Ordinary Wage Earner or a Trained Man?

I often wonder if the young men of the country realize the thousands of **big money-making opportunities** that are open today in connection with the automobile business. This business is absolutely unequaled as a field for big success—you know that if you will just stop and think. The industry is so big, it is growing so fast, there are so many angles to it and so much money in it that it is only a question of **which** branch of the automobile business to go into.

And these opportunities exist everywhere; right in your home town or even on the farm. As an example, one of our former students, a farmer boy, writes that since graduating at Greer College of Automotive Engineering the people there found out what he knows and can do and they bring their cars to him right on the farm—often coming from towns where there are old established garages—in order to get **him** to overhaul and repair their cars. He is making **big money** in his chosen work, right at home, and has more business than he can handle; and there are similar opportunities everywhere.

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There is a **real need** for **trained automobile men.** But you **must know** the **business.** The demand today is for **trained men**—men who have not only **studied** the automobile but men who **have done the work,** under the direction of experts. Books are all right, but here at Greer College of Automotive Engineering, in addition to textual instruction you **apply** that instruction by the actual work. Then, and then only, are you really master of the subject. **Greer graduates know,** because the whole thing is clear to them and they have **actually done the work before.** That's the kind of training **you** want.

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Here at Greer College of Automotive Engineering you will get personal attention, individual instruction. We take considerable pride in giving our students such careful and thorough instruction that to be a Graduate of Greer College of Automotive Engineering means not only **prestige** but **money-making ability.** We are not aiming to be the **largest** automobile school; but we do not let anything prevent us from giving the very **best** instruction possible to our students.

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Orvin Greer

GREER COLLEGE of Automotive Engineering

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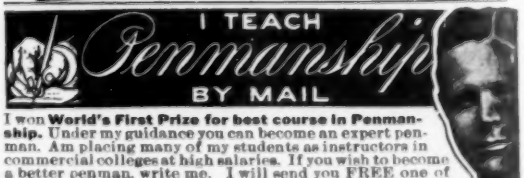

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$208 a Month Salary

Chief Draftsman
DOBE

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Signed, W. A. F.
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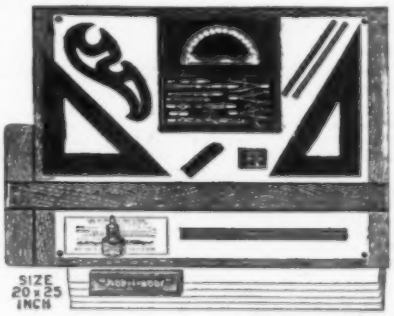
I am Chief Draftsman of a large and well known company. I know the kind of training that men need to make big salaries. And I will give you just that kind of practical working instruction during your spare time. I will train you personally and then help you get a job.



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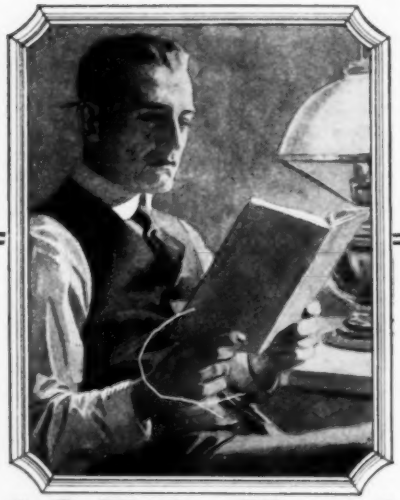

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Explain, without obligating me, how I can qualify for the position, or in the subject, *before* which I mark X.

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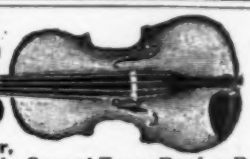

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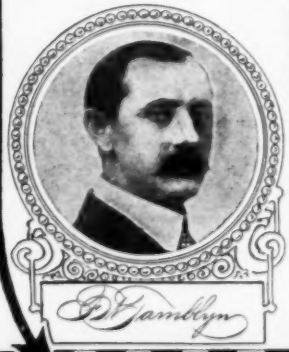

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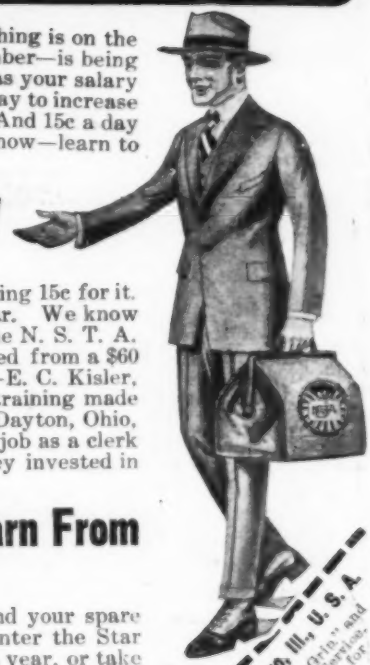

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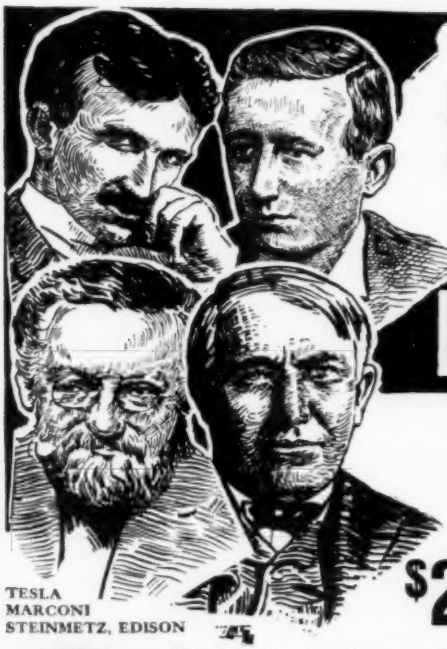

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ARE you satisfied with your present income? If not write for my extremely interesting booklet. Explains splendid plan that should net you $100 weekly. Spare time work—no canvassing. Not a mail-order proposition. Sent free. Address Thomas Steel, Box 1823, Washington, D. C.

WANTED District Superintendent — Reliable man of ability to book orders and engage sub-agents. Whole or part time. Exclusive territory. Pay weekly. Act at once before your territory is assigned. Knight & Bostwick, Nurserymen, Newark, New York State.

MAKE Big Money. Gold Transfer Monograms for Automobiles, etc. Free Samples. Address, National P. O. Box 41, Station D, Brooklyn, New York.

HAVE you something new for sale? Let me be your agent. F. Andresen, Pass Christian, Miss.

AGENTS, $10 to $15 daily. Every owner wants his gold initials on side door of automobile; applied while waiting. Your profit $1.38 on a sale of $1.50. Or sell him a set that he can apply his own monogram. Monogram Supply Co. Write for general agency. Free samples also for our special offer. Gumersall Bldg., Newark, N. J.

AGENTS—Small town, country: Yankee Fire Kindler. 100 fires, 3c. Oil, no kindling, cannot explode, lasts lifetime; 200% profit. Kindler and terms, 25c. Yankee Kindler Co., 206 E. 47th St., Chicago.

NOTHING like these formulas ever on sale before. 30-extra-fine soda fountain syrups and ice creams. Also Face creams, Hand Lotions, Auto Polishes, Carbon Remover and many others. Plain Instructions. All for 50 cents in stamps. Nite Mail Order & Supply Co., 609 27th St., Denver, Colo.

AGENTS: Carbono. The Guaranteed Auto Fuel Saves 30% Gasoline, Increases Power, Eliminates Carbon. $10 to $20 a day. Liberal Proposition. The Dobbyn Mfg. Co., 1136 Wrightwood Ave., Chicago, Ill.

AGENTS — Sell Tipco Emergency Soap to all motorists, machinists, etc. Removes all grease or other dirt without the addition of water. Leaves the hands dry and skin soft. Fast seller — Big profits — Exclusive territory. Sample free. Ignition Plug Co., 1411 W. Broadway, Louisville, Ky.

TWO 1-phase motors, 2-Hp., practically new. Year's Guarantee. $125 each. Hambrick Electric Co., Ft. Worth, Tex.

WE want live representatives in your locality selling Bull Dog Inner Tires. Inner casing for automobile tires. Guaranteed to prevent punctures and blowouts, tire fabric not canvas. Double tire mileage. Easy to sell. Big demand. Protected territory. Agents making $150.00 weekly. Eastern Auto Specialty Co., Dept. A, Utica, N. Y.

AGENTS—You can sell a 10-ounce bottle of "Mystol" Vanilla, "America's Greatest Flavor," at every house, at 50 cents. You make 30 cents. Guaranteed to equal any flavor made and every sale gets you another. Let us tell you how. Write now. Mystol Co., Glens Falls, N. Y.

HERE'S a line you can sell! Big profits too! Fruit Drinks, Spices, Extracts, Toilet Articles, Vegetable Soaps, Remedies, Household Preparations. Over 125 products, all guaranteed. Branches at New York City, Memphis, San Francisco, Winnipeg and Hamilton give prompt shipping service, low freight rates. Ours is the oldest, largest and most successful agency house in the world. Particulars free. Write today. Dept. M.P.-2, The J. R. Watkins Company, Winona, Minn.

AGENTS — To sell household necessity. Every woman wants and buys it. Goods sent to you on credit. You sell them, then pay us. Unsold goods may be returned. You pay for only those you have sold. Absolutely square deal. Write today. This is a money maker. G. H. Brummund, Horicon, Wis.

SIGN Letters for windows. Genuine Gold leaf. $50 week easily made. Chicago Sign System, 326-F, River St., Chicago.

AGENTS are making $25.00 per day selling a mechanical tool. Something the other fellow has not got. It is not sold in stores. The first time it is used it has paid for itself. It appeals to every person owning or leasing a building. Write, James E. Ellis, Mfr., 1040 Georgia St., Los Angeles, Calif.

MAKE and sell your own goods. Machinery unnecessary. Expert Chemists advise. Special attention to beginners. Write for Formula Catalog. Blake Mystic Company, Washington, D. C.

SIGNS for stores and offices. Entirely new. $50 weekly easily made. Chicago Sign System, 326-F, River St., Chicago.

MEN, get into the wonderful tailoring agency business, big profits taking orders and your own clothes free. We furnish fine sample outfit and everything free. No experience needed. Write today. Banner Tailoring Co., Dept. 415, Chicago.

PUTTING new article on market this month. No competition; every store or factory steady customer; 100% profit. Drake, Lock Box 2117, Philadelphia.

ARE you satisfied with your present income? If not, write for my extremely interesting booklet. Explains splendid plan that should net you $100 weekly—spare time work—no canvassing. Not a mail-order proposition. Sent free. Address Thomas Steel, Box 1823, Washington, D.C.

AGENTS—$10 profit on every sale. Russell sold 327 in 5 months; Elliott 187 in 2 months. Oliver Oil Gas Burner makes 2 gals. kerosene equal 87 lbs. coal; fits any coal or wood stove. More heat; turns on and off like gas. Write Oliver Oil-Gas Burner Co., 1385 N. 7th, St. Louis, Mo.

NEW Windshield Cloth solves baffling problem. One wipe cleans rain-blurred windshield. Stays clear 24 hours. Motorists amazed. Agents getting rich. 300% profit. Exclusive territory. Cabco Co., Toledo, Ohio.

DISTRIBUTORS Wanted for Every Town. A Selling Winner. Wonderful Coal Saver. Makes Hot Blast of every Furnace. 20% Coal Saving Assured the User. 150% Returns on Investment to Distributors. Get our Proposition Quick. Crown Fuel Saver, Richmond, Indiana.

AGENTS, sell your own Laundry Tablets under your own name and brand. We furnish free samples and two-color illustrated and imprinted circulars with every order. Particulars free. Sample package sent for 15 cents. Krebs A. Products, College Point, N. Y.

AGENTS Wanted: Ladies and Gentlemen; Sells every family. Profits 100% up. Permanent. Sample 25c. Dept. H, Box 527, Stanley, Wis.

ARE you satisfied with your present income? If not write for my extremely interesting booklet. Explains splendid plan that should net you $100 weekly. Spare time work—no canvassing—not a mail-order proposition. Sent free. Address Thomas Steel, Box 1823, Washington, D. C.

REPAIR Leaks Permanently with Kenitram Mastic Cement. Acidproof, Sunproof, Waterproof, Paste Form. Easily applied. Used foundation to roof. 50c money order brings package postpaid. Steady income. Martinek Company, 405 Lexington Ave., New York.

MAKE easy money in spare time pasting up stickers in public places. Advertising Household Specialty. Sample of article and stickers 25c. Thomur Co., Haverhill, Mass.

VULCANIZING auto-tires growing profitable business, especially now. Easy to learn. Instruction book $1. Plants $50 up. Catalog free. Equipment Company, 5 Canal St., Cincinnati, Ohio.

BIG Earnings Easy—Startling invention Banishes spark plug trouble. Saves gasoline. Sells like wildfire. Exclusive territory. Agents write quick. Jubilee Mfg. Co., Desk 23, Omaha, Nebr.

AGENTS—If you want to make money fast and easy get agency for Christy's Waterproof Shampoo Apron. Something new! Sells in every home. Big bottle Cocoanut Oil Shampoo free with every apron. Also other household necessities. Get particulars; free sample immediately. Christy, 81 Union, Newark, New York.

AGENTS: Everlasting Necktie Valet removes wrinkles from used neckties (without ironing them). Sells on sight. 25c. Agents' price: Ten for one dollar. 190 Pilgrim, Highland Park, Mich.

WONDERFUL Chance. Men's Shirts and Furnishings at wholesale rates or make $10 daily as agent starting real business. Goodell Co., Dept. 44, 5 Duratex Bldg., New York.

AGENTS—Send for sample "Fretnot" —the washday wonder. Be convinced you can do a whirlwind business. You can clear at least $20 to $100 weekly, according to spare or whole time. You don't have to talk; if she doesn't buy at sight, leave sample, she will be looking for you long before you are able to make the rounds again. Samples furnished free. Premiums for your customers. Exclusive territory guaranteed to agents who can produce. Credit given. Don't call. P. M. Matter & Sons, 3213 Warren Ave., Chicago.

INSYDE Tyres, inner armor for Automobile tires, double mileage and prevent punctures and blowouts. Quickly applied. Cost little. Demand tremendous. Profits unlimited. Details free. American Automobile Accessories Co., Dept. P, Cincinnati, O.

TAILORING Agents Wanted—Big complete sample outfit and case, nearly 200 large cloth samples, 3-price lists and everything needed for canvassing, or use in store, free to live agents. $25.00 to $50.00 a week; may make more. Write us today for free elegant outfit to begin, cloth samples, wholesale prices, special offer on a suit for yourself and full information.—See our wonderful values, beautiful fabrics and styles. Established 28 years. Every garment made to measure—everything guaranteed and express prepaid. Just send a postal. American Woolen Mills Co., Dept. 1158, Chicago.

SELL the line that hasn't been worked to death. 25% to 31% more than usual for selling staples. $50 a week easy. $100 a week quite common for those selling our Sanitary Brushes, Dustless Mops and Dusters. Good territory available. Promotion for producers. Modern factory and convenient distributing houses assure good service. North Ridge Brush Company, 107 Clark Ave., Freeport, Ill.

AGENTS—Newest Invention: "Inkspoon" makes every pen a fountain pen. Fast office seller; big profit, demand increasing everywhere. Exclusive territory offered. Sample free. H. Marul Company, Tribune Bldg., New York.

AGENTS—Steady Income. Large manufacturer of Handkerchiefs and Dress Goods, etc., wishes representative in each locality. Factory to consumer. Big profits, honest goods. Whole or spare time. Credit given. Send for particulars. Freeport Mfg. Co., 59 Main St., Brooklyn, N. Y.

EVERY Woman Wants Silvoplate — Magic Cleaner that never fails. Sure, easy sales plan; main or sideline; quick profits; prepaid deliveries. Sample 10c; dozen $1.60. L. B. Sutton, Manufacturer, D-3, New Canaan, Conn.

TAILORING Salesmen, and hustlers without experience, to take orders for large wholesale tailors in factories, shops, etc. All or spare time. Wonderful opportunity to earn big money. No investment. We furnish everything. Don't wait, write today. State experience and present employment. Address Commercial Tailors, 838 W. Jackson Boul., Chicago.

AGENTS—Our Guaranteed Products are a necessity for automobile owners and the general public. Big demand; repeat orders galore; big profits. Products for demonstration furnished free. Write Alfred J. Fisher, President, 100, Hannibal, Mo.

AGENTS: $30 to $100 a week. Free samples. Gold sign letters for stores and office windows. Anyone can do it. Liberal offer to general agents. Metallic Letter Co., 431E N. Clark, Chicago.

MAKE $30 next Saturday. Agents—Salesmen—District Managers—brand-new invention selling like wildfire. Sell Speederator for Fords. So good it's used by 17 officials of Ford Motor Co. Makes any Ford run like a Packard. Stops stalling and bucking. Put on quick—no special tools or holes to bore. Instant satisfaction. Listen: make money quick—sell ten to twelve a day easy. McAllister, Ills., sold four first afternoon, profit $12. Helton, Utah, makes over $300 every week. Dane, W. Va., $55 a week spare time only. Hurry; write quick for details and exclusive territory. Address Perrin Company, 1012 Hayward Bldg., Detroit, Mich.

AGENTS Wanted. Address Anderson's, 721 P Exchange, East St. Louis, Ill.

EASY, pleasant work for Mechanics, Shop Men, Clerks, during spare hours; will add many dollars to their salaries. Also want persons who can give full time. Big wages assured. Novelty Cutlery Co., 67 Bar St., Canton, Ohio.

AGENTS—If you want to average $10 daily, sell a high-grade line of combs, brushes, mirrors and other novelties in Ivoryware. Direct from factory to consumer. Enormous demand. Particulars free. Yaneco Ivoryware Co., Leominster, Mass.

DROP Everything Else. Sell Guaranteed Silk hosiery and underwear all or spare time, direct from factory to consumer. Big money maker. Big commissions. Prompt deliveries. C. & D. Company, Dept. 12, Grand Rapids, Mich.

SPIRAL Curtain Rods; Broom protectors; Ironing board clips. Tremendous sellers. Moore Co., 800 Jerome Ave., Cincinnati.

AGENTS — Stamping names on Pocket Key Protectors; sample Check with your name and address, 12c. Stamping Outfits, Emblem Checks, Check Fobs, Name Plates. Hart Mfg. Co., Desk 2, 393 Degraw St., Brooklyn, N. Y.

AGENTS: Big profits. Best and cheapest window letters made. Easily applied. Dime brings five samples. Particulars free. Staibrite Co., 1115 Second Ave., New York.

HUGE profits selling Nibco Sanitary Brushes, Auto Washers, Brown Beauty Adjustable Floor Mops, Dustless Dusters, and other specialties. Big line. Fast sellers. Write today. Silver-Chamberlin Company, Department M, Clayton, New Jersey.

PATENTS—Write for our free illustrated guide book, "How to Obtain a Patent." Send sketch or model for our opinion of its patentable nature free. Highest references. Prompt attention. Reasonable terms. Victor J. Evans & Co., 163 Ninth, Washington, D. C.

SIGN Letter Agents and Painters: 500% Profit Gold and Silver Sign Letters for Stores and Office Windows. Anyone can put on. Big demand. Free samples. Metallic Letter Co., 431D N. Clark St., Chicago.

AGENTS Sell Neverfail iron rust and Stain Remover. Huge Profits. Big line. Sample. Write today. Sanford-Beal Co., Inc., Newark, N. Y., Dept. 6.

A WHIRLWIND seller for man with auto. Our big Six-In-One tool, the Handy Worker: comprises anvil, vise, pipe vise, drill press, corundum grinder and cutting hardie. Weight 90 pounds. Sells for $20 with fine profit to you. Always pleases. Every farmer, janitor, plumber, private or public garage, small shop, etc., a prospective buyer. No trick to sell it and big money to be made. Write Chicago Flexible Shaft Company, Dept. S. O., 5600 W. 12th St. Chicago.

AGENTS—Most wonderful seller; 96c profit every dollar sales; no license required; no stock to carry; sample free. Mission Bead Company, 1617 Irola, Los Angeles, Calif.

ENORMOUS Profits selling Duo Guaranteed Products. Easy sales at every house. All or spare time. Outfit Free Write Quick. Duo Co., Dept. AL, Attica, N. Y.

AGENTS wanted to sell Egginit—a pure food substitute for eggs. Easy selling article—big profits—quick repeater. Stuart & Co., 16 Main St., Newark, N. Y.

AGENTS—Quick seller. Big profits; California Rosebeads, selling like hot cakes. Hustlers coining money. New stuff. Free catalog. Mission, 2819PM, W. Pico, Los Angeles, Calif.

AGENTS — Something different! Our Eradium (Luminous) Crucifix actually Shines in the Dark. Startling! Mysterious! Wonderful enthusiasm follows every demonstration. 150% profit on every sale. Sole manufacturers. The Pioneer Corporation, 1259 W. 63d St., Chicago, Ill.

AGENTS make $100 monthly selling our 500 handy household articles. Catalogue free. Scheff Company, Desplaines, Ill.

AGENTS: Big Returns, fast office sellers; particulars and samples free. One Dip Pen Company, 2 Daily Record, Baltimore, Md.

"STOVOIL" is not merely stove polish but a rust killer and preventive. Women are crazy about it. Profits big and fast. Much repeat business. Write at once. Superior Laboratories, Grand Rapids, Mich.

AGENTS—A New One! Harper's Fibre Broom and Ten-Use Brush Set combined. Saves broom expense; lightens housework; easy seller; first order returnable. Harper Brush Works, Dept. X, Fairfield, Iowa.

NEW Carburetor for Ford Cars, simple, not a moving part, installed in thirty minutes, guaranteed to double your mileage and start in zero weather without heating or priming. 15 days' Free trial. Our St. Louis man sold 2,000 in 8 months. Salt Lake City man made $1,200 in one week. Write U. & J. Carburetor Co., K-505 W. Jackson Blvd., Chicago.

SELLS like hot cakes. Big profits. New ironing wax also starch. Perfumes clothes lasting violet. Working outfit 5c. Territory given. Marshall Manufacturing, 919 Gates Avenue, Brooklyn, N. Y.

IDEAL Sideline. Business men buy on sight. $1.00 seller, 400% profit. K. Home, 1957 Warren, Chicago.

MAN—To distribute samples, circulars, for "Foot Ointment," mail or hand; splendid opportunity. Write us today. Address The Elder Co., 294 Parkdale, Buffalo, New York.

AGENTS—New Patented Curtain Rod; necessity in every home; 100% profit; 4 to 10 sales at every home; write for free sample. Home Curtain Rod Co., Providence, R. I.

AGENTS are making $25.00 per day selling a mechanical tool. Something the other fellow has not got. It is not sold in stores. The first time it is used it has paid for itself. It appeals to every person owning or leasing a building. Write, James E. Ellis, Mfr., 1040 Georgia St., Los Angeles, Calif.

SEND for free catalogue "Golden Opportunities." Typewritten tested Formulas. Chemical Analysis. Trade Secrets in every line. No printed trash. Satisfaction guaranteed. Industrial Sales Service, 73 Washington, Memphis, Tenn.

PORTRAIT Agents. For Quality Portraits at Right Prices, with Quick Service. Write the Service Art Co., Sta. D, Chicago.

EVERY Home on Farm, in Small Town or Suburb needs and will buy the wonderful Aladdin coal-oil Mantle Lamp. Five times as bright as electric. Tested and recommended by Government and leading Universities. Awarded Gold Medal. One farmer cleared over $500 in six weeks. Hundreds with rigs or autos earning $100 to $300 per month. No experience needed. Excellent spare time and evening seller. No Capital Required! Write quick for distributor's proposition and lamp for free trial. Mantle Lamp Co., 917 Aladdin Bldg., Chicago.

AGENTS! Quick Sales! Big Profits! Outfit free! Cash or credit. Sales in every home for our beautiful Dress Goods, Silks, Hosiery, Underwear and General Dry Goods. Write us today. National Importing & Mfg. Co., Dept. LD, 425 Broadway, New York.

AGENTS, $50 a week. Will show you how. Genuine Gold Leaf Window Letters. Chicago Agency Co., 842 Altgeld St., Chicago.

SELL this new auto wonder: Mystic-Cloth solves blurred windshield danger: one rub, presto! glass stays clear 24 hours; rain or snow, auto or railways—same magic result! agents sold 30,000 first month. Security Mfg. Co., Dept. 160, Toledo, O.

500 AGENTS wanted at once for Mitchell's Magic Marvel Washing Compound. 300% Profit, Enormous Repeater. Washes Clothes spotlessly clean in ten to fifteen minutes. One thousand other uses in every home. Astounds and delights every woman. Nothing else like it. Nature's mightiest cleanser. Contains no lye, lime, acid or wax. Free samples furnished to boost sales. We positively guarantee the sale of every package. Exclusive territory. Own Your Own Business. You cannot fail to make big money. Barber, Ohio, made $600 last month. Send for free sample and proof. Hurry! hustle, grab this chance. L. Mitchell & Co., Desk 300, 1312-1314 E. 61st, Chicago.

AGENTS are coining money selling Brussels Fibre Brooms. Outlast six corn brooms. Retail $1.75. Sample postpaid 75c. Also Sanitary Brushes. Cramer Mfg. Co., Wichita, Kans.

AGENTS—No matter what you want, if you know the trade name or brand of any article, but not the manufacturer, we will furnish the information for 25c. Colman Mercantile Co., 4421 Manchester Ave., St. Louis, Mo.

AGENTS—Sell rich-looking imported 36x68 rugs, $1 each. Carter, Tenn., sold 115 in 4 days. Profits, $57. You can do same. Write for sample offer selling plan; exclusive territory. Sample rug by parcel post, prepaid, $1.19. E. H. Condon, Importer, Stonington, Maine.

AGENTS make 500% profit handling Auto Monograms, New Patriotic Pictures, Window Letters, Transfer Flags and Novelty Signs. Catalog sent Free. Hinton Co., Star City, Ind.

YOU can letter Automobiles, Windows, Trunks, etc., without previous experience, by Transfer Process. Make $27.50 on $2.50 outfit. Auto Monogram Supply Co., 86 Niagara Building, Newark, N. J.

WONDERFUL Small Article. Every man needs. Agent sold 14 one office; profit $2.45. Carry hundred in pocket. Particulars and 2 samples 25c. Arrow Mfg. Co., 778 17th St., Milwaukee.

AGENTS wanted to sell my Galvanized Steel Suction Washer. Stamp for particulars. Obetz, Hayesville, Ohio.

AGENTS—500% profit: Sign letters for office and store fronts. Samples and particulars free. Inter-State Letter, 2620 North Halsted St., Chicago.

MINUTES Pay Dollars demonstrating new $10.00 Adding Machine. Wonderful invention. Adds, Subtracts, Multiplies, Divides, automatically. Whirlwind in speed. Infallibly accurate. Work equals $200 machine. Five-Year Guarantee. Offices, stores, factories buy from one to dozen. Enormous demand everywhere. Big Profits. Write quick for trial offer and protected territory. Calculator Corporation, Dept. F, Grand Rapids, Mich.

AGENTS: Big Profits putting up Genuine Gold Leaf Window Letters; Script and 15 other Styles. Chicago Agency Co., 848 Altgeld St., Chicago.

AGENTS—Men and women—100% profit selling Cascade Steam Washer. Great time and labor saver, thousands in use. Sells quickly on demonstration. Live wires make $20 and up daily. H. M. Sheer Co., Quincy, Ill., Dept. C-6.

PORTRAIT Agents: Our goods will make you big profits. Delivery guaranteed. Rejects credited. Prompt shipments. Send for latest catalogue and prices. Adam J. Kroll & Co., 602 Blue Island Ave., Chicago, Ill.

AGENTS Wanted — Economy Kerosene Burners for cooking and heating stoves and furnaces. Big profits. Exclusive territory. Economy Mfg. Co., Dept. D, 616 W. Monroe St., Chicago, Ill.

YOU can be your own boss with our Key Check outfit. Good for $5 a day stamping names on pocket key checks, fobs, etc. Sample check with your name and address, 15 cents. Pease Die Works, Dept. M., Winchester, N. H.

AGENTS—Best seller: Jem Rubber Repair for tires and tubes; supersedes vulcanization at a saving of over 800 per cent; put it on cold, it vulcanizes itself in two minutes, and is guaranteed to last the life of the tire or tube; sells to every auto owner and accessory dealer. For particulars how to make big money and free sample, address Amazon Rubber Co., Amazon Bldg., Philadelphia, Pa., Dept. 505.

HIGH Class Laundry Specialty every woman will use. Not a Laundry Tablet—absolutely new. Repeater. 100% profit. Investigate immediately. Lawrence Chemical Co., Marietta, Ohio.

MEXICAN diamonds flash like genuine, fool experts, stand tests, yet sell for 1-50th the price. Few live agents wanted to sell from handsome sample case; big profits, pleasant work. Write today, Mexican Diamond Impt. Co., SW, Las Cruces, N. Mex.

AGENTS. 100% Profit selling our Automobile and Furniture polish. The Brownola Works, Dept. A, 336 15th St., Buffalo, N. Y.

AGENTS: The demand for "Kar-Bon-Ex" is growing greater every day. Join our sales force, and make 150% profit, territory is going fast. A postal will do, send it Now. American Sales Co., B. 401, Haverhill, Mass.

WANTED 500 new agents at once. Make 100% profit selling our silver and metal polish. Send 25c for full size jar, or $1.50 per doz. The Brownola Works, Dept. A, 336 15th St., Buffalo, N. Y.

AGENTS, deal with the manufacturer. Best goods, prices and profits. Food products, Soft Drinks, Toilet Preparations. Easy sellers for men and women, experienced or beginners. Outfit furnished. Fletcher Production Co., 315 Clinton, Chicago.

WORLD'S Fastest Selling Auto Accessory! County Distributors wanted; write today. G. L. W. Spring Oiler Co., San Diego, California.

SPLENDID opportunity for live sales managers to control City, County and State agencies for Rexblu. Stevens Wiley Mfg. Co., Inc., Diamond and Fairhill Sts., Phila.

AGENTS — To sell the Four-In-One Wringer Mop; Just out; A Sanitary Mop, Adjustable Mop Wringer, Scrub-Brush and Scraper Combined. The Mop which wrings exactly like a clothes-wringer; Guaranteed for three years; 100% profit; Agents coining money; Highly endorsed; Territory given to General Agents and protected; The best Agents' proposition on the market today; Let us prove it to you. Write at once for terms and territory. Four-In-One Mfg. Co., 445 N. 11th St., Philadelphia, Pa

HOW Much Gasoline can you sell at 2c per gallon? World tests for Four years to prove it. Secure exclusive rights for your county. "Carbonvoid," Box "H," Bradley Beach, N. J.

YOUR coal bill can be shaved! We have been shaving coal bills for four years. Let us show you the "Evidence." You can secure the county right. Try it.—Your money back if you're not satisfied. "Koaline," Box "Q," Bradley Beach, N. J.

GET our big money maker monogramming Autos, etc., by transfer method. Catalog and particulars free. Motorists' Accessories Co., Mansfield, Ohio.

KEROSENE Gas Burners in Cook stoves, stop use of wood or coal. Patented. Get exclusive territory. The Vapor Gas Burner Co., Desk 8, Columbus, Ohio.

FREE! Patent buyers' names. Patent News-m, Washington, D. C.

AGENTS. $10 a day selling our Gritless Mechanics Hand Soap. Exclusive territory. Send 25c for full size can. The Brownola Works, Dept. A, 336 15th St., Buffalo, N. Y.

SOAP Agents, send for Free sample and selling scheme. Morgan Supply Co., 113, St. Louis.

HIGH-GRADE SALESMEN WANTED

SALESMEN—To sell the well known line of Rock-A-Bye nursery accessories to furniture, hardware, department, variety stores and baby shops. Liberal commissions, state your line, experience and give references. Perfection Mfg. Co., 2701 N. Leffingwell, St. Louis, Mo.

SALESMEN Wanted. $20.00 daily earned by steady workers. Write for letters from men who are doing it. New Automobile article, sells rapidly everywhere. Experience unnecessary. Write Deco Co., Department D, Springfield, O.

OUR protected article exclusively owned and controlled by us clears upward of $35.00 per day for salesmen. Most essential. Government created demand. Large territories to salesmen able to handle crews. Side-line or full time. If you cannot sell this specialty you will fail selling life preservers on a sinking ship. Definite co-operation. Jerome Laadt, Pres., 8 South Dearborn Street, Chicago, Ill.

FREE Salesmanship Course. Our practical money-earning course is paying our student salesmen from $15.00 to $40.00 a day right at the start. One young man who never sold goods before made $41.00 in his first day and a half. Samples will be loaned you on letter reference so you can earn while you learn. "Sales Course Dept.," 102 22nd St., Milwaukee, Wis.

EXPERIENCED Premium Plan Salesmen to sell the "Hilco" Profit Sharing System to Merchants, Flour Millers, Bottlers, Tea and Coffee Dealers, etc., etc., everywhere within a thousand miles of Chicago. Adapted to any line of retail, wholesale or manufacturing business. Liberal Commissions. Hinkle-Leadstone Co., Dept. P, 180 N. Wabash Ave., Chicago, Ill.

MANUFACTURER'S Agent wanted to act as exclusive local representative for several new high-grade specialties selling to garages, general manufacturing plants, etc. No competition. No investment required. Territory now being assigned, commission basis. The right men can establish a permanent, profitable business. For application forms, address P. O. Box 317, Newark, N. J.

SALESMEN—Side or Main line, to sell low-priced 5,000-mile guaranteed tires, 30x3½ non-skid sells for $11.95; other sizes in proportion. Good money-making proposition for live wires. Write, Consolidated Tire Co., 616 So. Michigan, Chicago.

SALESMEN: To sell Gum Vending Machines and Ball Gum. Liberal commissions, exclusive territory. Dunwin, 1814 Chestnut, St. Louis.

SALESMEN Wanted — Brewery, Cigar, Drug, Coffee, Grocery, Candy Men, Sell Gum Vending and Trade-Boosting 5c Machines. Cash or credit. $9 commission each sale. Renewals on Gum. Sell 100 Machines $300. Monthly Renewal. Peanut and Gum Operators, Inquire. One Sanichu equals 20 Penny Vendors. Exclusive Territory. Sanichu Gum Co., 3624 Cottage Grove Ave., Chicago.

SALESMEN—City or Traveling Experience unnecessary. Send for list of openings and full particulars. Prepare in spare time to earn the big salaries—$2,500 to $10,000 a year. Employment service rendered members. National Salesmen's Tr. Ass'n, Dept. 125-W, Chicago, Ill.

TWO salesmen making coast to coast automobile tour, starting January First, desire several meritorious sales or advertising propositions. Submit particulars immediately. Box 1047, Jacksonville, Fla.

SALESMEN: To sell securities in company manufacturing wonderful invention. Great demand, highest commercial reports. Agents earn $100 upwards weekly. Good sideline. Write today for sample and particulars. Graham & Co., 66 Broadway, N. Y.

SALESMEN: Immediately write for proof of the fastest selling automobile specialties on the market. Sure success. Big money and a business of your own. Continental Auto Supply Co., Desk B, Davenport, Iowa.

SALESMEN, get this live winter specialty—the Hot Spot Starting Primer for your Ford motor. Heats the manifold and primes the motor with hot gasoline. Start your car with ease in zero weather. Ford owners delighted. Retails at $3.00. Liberal discount. Fully guaranteed. Particulars free. B-276, Auto Products Co., Washington, Pa.

SALESMEN each county and city make ten dollars a day and more. Necessity to every car and truck owner. Duplicate orders increase your income. Write for particulars. Nob rac Company, Room 528, 1777 Broadway, New York City.

WILL Stick and Stay Stuck, Tube repair outfit, 35c, 60c and $1.00. Liberal discount to dealers. Salesmen wanted. Emerson Supply Co., 1410 W. 63d St., Chicago.

SALESMEN—$10—$15 daily selling gold transfer letters for autos to supply stores, garages, etc. Send for free samples of your initials; general agency given. Transfer Supply Co., Gumersall Bldg., Newark, N. J.

SALESMEN, $100 a week can easily be earned, selling our high grade phonographs. Write us for our proposition. National Phonograph Co., Dept. 20, 518 Penn Ave., Pittsburgh, Pa.

WANTED—Salesmen with Ford or small car to sell 5c candy specialty to retail trade; exclusive territory; live salesmen can make $50 to $75 per week; state experience and references. Ramsay Products Co., Chicago.

SALESMEN to sell Oils, Belting, Paint, Roofing, Roof Cement, general supplies to garages, factories, mills, stores, auto owners, farmers, threshers. Splendid proposition. Paid weekly. O. L. Doty, Dept. 33-B, Cleveland, Ohio.

SALESMAN to sell Universal Soot Destroyer to hardware dealers and engineers of steam plants. Northern Chemical Works, 1308 N. Wells St., Chicago.

DISTRICT Managers Wanted. The latest discovery in Polishes. Cleans and polishes automobiles without the use of water. A twentieth century furniture polish. We want district managers everywhere. $1 brings you sample case and proposition. The U-Kan Company, Dept. B, Lykens, Penna.

SALESMEN for excellent proposition, side line also. Box 342, Passaic, N. J.

BIG Men wanted to manage exclusive selling territory. Only low priced universally adapted, draft operator on the market. No triflers. If you can invest $175 in business of proven merit since 1910 get particulars. V. F. T. Company, 190 Main, White Plains, N. Y.

SALESMEN—Pocket Side Line. Law compels use. Highly endorsed; patented; nothing like it on market; good seller; good commission. Muzzle Co., 333 S. Dearborn St., Chicago.

SALESMEN in every state wanted to sell our High Grade Combination Assortment of Household Utility Brushes to dealers. An exceptional opportunity. American Brush Corporation, 1214-1222 W. Madison St., Chicago, Ill.

ALASKA salesman wants a few good lines. Address Box 74, Cordova, Alaska.

SALESMAN. Energetic man to handle our line of high grade advertising and commercial pencils, good commissions. Write. Peerless Pencil Co., Louisville, Ky.

SALESMEN—Sell Gummed Tape Sealing Machines; good profit and extra commission on orders for tape; write International Sales Company, 222 North Wabash Avenue, Chicago, Illinois.

WERE You Ever Offered a Grocery Store? You can handle Sugar, Flour, Canned Goods, Dried Fruit, Coffee and entire line of Groceries, as well as Paints, Roofing, Aluminum Ware and Automobile Oils, with no rent to pay; no money invested; take large orders from samples. Goods are guaranteed and proven quality. Selling experience not necessary. Steady, profitable work for "workers." Address Hitchcock-Hill Co., Dept. 200, Chicago, Ill. Reference: any Bank or Express Co.

$40 TO $100 a week. Free Samples. Gold Sign Letters anyone can put on windows. Big demand. Liberal offer to general agents. Metallic Letter Co., 431C, N. Clark, Chicago.

FASTEST Selling Advertising Specialty Made. Your customers—why not sell them. Best side line yet. Look us up, then write C. E. Erickson & Co., 202 Erickson Bldg., Des Moines, Iowa.

CALIFORNIA Rosebeads selling like hot cakes. Agents coining money. Absolutely new. Big profits. Catalog free. Mission Bead Company, SP2819 West Pico, Los Angeles.

SALESMEN Wanted to sell Electric Cigar Lighters and Moisteners. Salary or commission. You carry stock or we ship direct. Write for special offer. Drake Mfg. Co., 221 Grand, Milwaukee, Wisc.

SALESMEN wanted to solicit orders for Lubricating Oils, Greases and Paints. Salary or commission. Address The Lennox Oil & Paint Co., Cleveland, Ohio.

REPRESENTATIVE Wanted — We want an aggressive man to devote whole or part time on substantial, dignified, high-class proposition. Every steam plant a prospect. Every order means a repeat. Address Dept. H. 1750 Monadnock Blk., Chicago.

SALESMEN can make $5.00 daily selling our Calendars, Adv. Novelties, Pencils, Blotters, Signs and Thermometers; liberal terms; sells entire year; fine side lines; local and traveling agencies. Model Calendar Co., Dept. 226, South Bend, Ind.

SALESMEN, Agents and Dealers, we want you to handle your own county or district and make big money. We manufacture the best values in phonographs. The Classic, hundred-dollar phonograph, retails for sixty-nine fifty. A hundred and twenty-five dollar phonograph retails for seventy-four ninety-five. Half profit to dealers. Other types, price from seventeen-fifty upwards. Illustrations and full particulars sent on request. Samples furnished on thirty days' trial. Send references with first letter. Classic Phonograph Makers, Dept. PM., 316 S. Wabash Ave., Chicago, Ill.

SALESMEN — Complete line Sanitary Brushes, Mops, Brooms, combining highest quality with latest designs. Best house-to-house proposition in America. Our salesmen actually clearing $7.50 to $25.00 daily. District Managers chosen from experienced salesmen. Sanford Brush Company, 544 West Lake St., Chicago.

"GALLAHER made $336.00 one week selling guaranteed Collection Systems used by all business men." Sayers Mfg. 2815 Sheffield, Chicago.

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MEN and Women Wanted by Government for many kinds of civil service work. Splendid salaries, short hours, other advantages. There may be a place for you. Investigate at my expense. Send name for List RR 2026, free. Earl Hopkins, Washington, D. C.

YOUR Chance! Used correspondence courses, all kinds. (Courses bought.) Write, Lee Mountain, Pisgah, Ala.

AGENTS — Christmas Articles — go like Hot Cakes around the Holidays. Your chance to clean up $200 to $300. Write quick for particulars. American Products Co., 1437 American Building, Cincinnati, O.

AMERICAN Made Toys Wanted. An opportunity for homeworkers on small scale and manufacturers on large scale. Unlimited quantities needed of Toy Soldiers, Army, Navy, Marines, Cannons, Machine Guns, Warships and other toys and novelties. Greatest chance for industrious people for independent business. Enormous demand and future in American Made Toys all over the United States, Canada, Mexico and South America with over 50,000 10-cent Stores and toy dealers. This new American industry stands out conspicuously. Factories are established, people trained, machineries made. Christmas Sets needed in millions this year. The great hit for 1919 without any competition. We are buyers of these goods all year, paying fixed prices. Attractive prices offered for painted goods. Experience or tools unnecessary. Hundred and more made complete per hour. Castingform outfits from $3.00 up. If you mean business, send for booklet and information free. Toy Soldier Manufacturing Co., 32 Union Square, New York.

BETTER Pay, shorter hours, easier work and other advantages can be had in Government positions which are easy to secure now. You owe it to yourself to find out if you are qualified. No expense. Just send name for Form RM 2026, free. Earl Hopkins, Washington, D. C.

YOU are a failure if you are working hard, long hours for low pay or your job is insecure. Why not find out without cost whether you can get a Government Position where pay is better, work easier, hours shorter, and many other advantages? There are chances now for thousands of men and women over 18. Let me give you free information. Just write your name, address and number RQ 2026. Earl Hopkins, Washington, D. C.

GOVERNMENT Positions are Desirable. Prepare for Railway Mail, Post Office, Rural Carrier, Customs-Internal Revenue, Departmental, Immigration and other branches through our expert, former Government Examiner. Write for free booklet giving full information about these positions and our Money-Back Guarantee Contract. Patterson Civil Service School, Box 4025, Rochester, N. Y.

ARE you satisfied with your position and prospects? If not, whatever your occupation, investigate your chance in Government Service. Just ask for Form RL 2026, free. Earl Hopkins, Washington, D. C.

PHOTOPLAYS in demand. Make extra money. We show you how. Details free. Rex Publishers, Box 175, H-45, Chicago.

MEN, get into the wonderful tailoring agency business, big profits taking orders and your own clothes free. We furnish fine sample outfit and everything free. No experience needed. Write today. Banner Tailoring Co., Dept. 414, Chicago.

RAILWAY Mail Clerk Examination Soon. Start preparing now. Write today for free booklet. Patterson Civil Service School, Box 6025, Irving Place, Rochester, New York.

BECOME expert auto mechanics. Earn $50 week. Learn while earning. Sample lessons free. Franklin Institute, Dept. M, 801, Rochester, N. Y.

WANTED—Assistant Superintendent Pattern Cutter and Estimator. State salary first letter. Replies confidential. The Breese Bros. Company, 2347 Reading Road, Cincinnati, Ohio.

GOOD pay for names, addresses. Write John D. Black, Kansas City, Mo.

$20 TO $35 per month to any employed person without interfering with regular work. No selling. No canvassing, positively no investment. Enclose stamp. Northwestern Silver Co., St. Paul, Minn.

WE have an opening for a draftsman who is familiar with machine tool designing. State age, experience and salary expected. The Kelly & Jones Company, Greensburg, Penna.

AUTO Experts Wanted, $35 week. Learn while earning. Write immediately. Franklin Institute, Dept. M, 801, Rochester, N. Y.

I AM paying one boy in every town a commission to help me sell Aerial Express Gliders. Write me today, enclosing twelve cents for two gliders. Edward R. Smith, Walla Walla, Washington.

THOUSANDS U. S. Government Census and Railway Mail Positions now open. Men—women, 18 up. $1100-$1700 year. Common education sufficient. Write immediately for list positions. Franklin Institute, Dept. M-21, Rochester, N. Y.

WANTED — Automobile, Tractor and Aeroplane Mechanics, expert tire vulcanizers, Acetylene Welders, expert Ignition and Battery men trained under our system, are in great demand everywhere at salaries from $150.00 to $400.00 per month. We operate positively the largest school system in America teaching practical courses. During the war, this was the only Automobile and Tractor School outside the state of Missouri which was approved and employed by U. S. Government War Department for training soldiers. We teach thoroughly practical courses in few weeks time. Free employment department for students. Special low season rates now on. Write or call nearest school for big new 100 page free catalog and special rates. Address: Dept. 75, Modern Automobile & Tractor Schools, 1803 3rd Ave. W., Spokane, Wash.; 700 Mercer St., Seattle, Wash.; 2512 University Ave., St. Paul, Minn., or Modern Automobile & Tractor Schools Ltd., Dept. 75, 840 Cambie St., Vancouver, B. C., Canada. America's Largest Practical Trade School System.

SUCCESSFUL F. O. B. Organizers all pay income tax. I don't care what your occupation is now. If you have a good personality and can talk convincingly, if you are strictly honest and dependable, if you are willing to work, and if you are not satisfied with your present earnings, I want to place our proposition before you to become a Beaver Organizer, to secure members and establish new lodges. Commission contract exclusively, but it pays. Will also consider men capable of helping to organize their own local lodge and acting as secretary. Write today. R. F. Webster, 721 Liberty Bldg., Philadelphia, Pa.

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U. S. GOVERNMENT wants Railway Mail Clerks. Average $117 month. Life Job. Common education sufficient. List positions open—free. Write immediately. Franklin Institute, Dept. M-21, Rochester, N. Y.

MEN Wanted. Railway Mail Clerks. $117 month. List positions free. Franklin Institute Dept. M-21, Rochester, N. Y.

LEARN Commercial wireless by mail in ten weeks. Thousands of positions now open for men, women and boys (ages 15 to 45) as radio operators, electricians, mechanics, and inspectors. Salaries for beginners now averaging $210 per month. Opportunity to travel and see the world or locate at one of many land radio offices. We train you by mail or at our local school to qualify for official license. No previous experience or wireless education necessary. Positions guaranteed to all students who secure license. First correspondence radio school in America. Established 1914. Wireless outfit Free to students for home practice. Write for Free booklet. National Radio Institute, Dept. 147, 14th and T Sts., Washington, D. C.

SEVERAL Thousand men—boys, 18 or over, wanted by U. S. Government as Railway Mail Clerks. Permanent life positions through poor times and good. Average pay $1400 year. Advance rapid. Pleasant work constantly traveling. Every second week off at full pay. Paid vacation. Common education sufficient. Write immediately for full list positions open and Fall examination schedules. Franklin Institute, Dept. M-3, Rochester, N. Y.

ATTENTION Citizens: Your Government needs many kinds of workers over 18, pays higher salaries for shorter hours and offers greater advantages. Don't miss your real opportunity by failing to investigate. Just send name for free List RS 2026. Earl Hopkins, Washington, D. C.

YOUNG men prepare as brakemen, firemen, begin now, positions good, write at once for particulars. Trainman's Service Bureau, Dept. 6, Jersey City, N. J.

WANTED—men—women, 18 up. Government Clerks. $100 month. Write immediately for list positions open. Franklin Institute, Dept. M-21, Rochester, N. Y.

HUNDREDS Railway Mail Clerks wanted. Average $117 month. List positions free. Write immediately. Franklin Institute, Dept. M-21, Rochester, N. Y.

FIREMEN—Brakemen — Baggage men — $140-$200, colored porters, by railroads everywhere. Experience unnecessary. 819 Ry. Bureau, East St. Louis, Ill.

DISSATISFIED with your pay, hours or work? Perhaps you can get just what you want in the Government Service which needs immediately thousands of men and women over 18 for all kinds of work. You owe it to yourself to investigate. Just send name, address, and this number RP 2026 for free information and advice. Earl Hopkins, Washington, D. C.

STOP Daily Grind. Start business silvering mirrors, plating tableware. Plans Free. Clarence Sprinkle, Dept. 28, Marion, Indiana.

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COLUMBIA School of Correspondence, Washington, D. C. Prepares for Commissions in Army, Navy and Marine Corps; also for entrance to West Point and Annapolis. There are also Civil Service and High School courses. Send for leaflets. Edward L. Comegys, Prin., Kenois Building, Room 413.

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INVENTORS desiring to secure patents should write for our book, "How to Get Your Patent," tells our terms and methods. Send sketch for our opinion of its patentable nature. Randolph & Co., Patent Attorneys, 620 F, Washington, D. C.

MAKE money writing Photo-plays: details free to beginners. No correspondence course. Producers' League, 230 Wainwright, St. Louis.

WRITE Articles, stories, news, in spare time for newspapers and magazines. Big pay. Copyright book Free. Press Syndicate, 553, St. Louis, Mo.

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AGENCIES Wanted. All kinds; send full particulars and samples to the China Commercial Company, 1a Canton Road, Shanghai.

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WANTED high grade articles suitable to selling by mail. What have you? Al Moeller, 1010 West Ninth Street, Des Moines, Iowa.

HAVE you considered the economy and advisability of changing from Steam to Gas Producer operation? Our authentic book "Power Gas and the Gas Producer" written by a recognized authority on this subject will enable you to judge intelligently. Price $1.00 postpaid. Popular Mechanics Book Dept., 6 N. Michigan Ave., Chicago, Ill.

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WE reach Mail Order buyers. Rate, three cents word. National Advertiser, Fitzgerald, Ga.

ADVERTISE in the West Virginia Advertiser. 30 words one year $1. E. J. Evans, Pub., 729 6th Ave., Huntington, W. Va.

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SPECIAL Luck display advertisement 150 magazine thrice $8.00. Page thrice $111.00. Woods Popular Service, Atlantic City, N. J.

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INCREASE your sales. Place your proposition before the readers of "Cartoons Magazine." 32,000 copies every month. Classified rate only 5c per word. Mail in a trial ad today. Cartoons Classified Dept., 78 E. Madison St., Chicago.

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EXTRAORDINARY values. Underwoods, Remingtons and other makes. Lowest prices for high grade guaranteed typewriters. Mention machine wanted. R. V. Johnson Co., 20-C, East Jackson, Chicago.

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UNDERWOODS, Olivers, Remingtons, $15 to $45; terms to suit; free trial. Typewriter Co., 193 N. Dearborn, Chicago.

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HALF Price for best typewriter ribbons. All kinds. Ribbon Co., Iowana, Miss.

GOOD Typewriter for sale cheap. Free trial. Easy payments. Write Bertha Payne, Shawnee, Kansas.

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RELIABLE Adding Machines on thirty days' trial. Latest models. Standard capacity. Five-year guarantee. Prices $10 up. Big illustrated catalog free. Calculator Corporation, Dept. E, Grand Rapids, Mich.

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LETTER-HEAD Printers. Good grade 20-lb. bond paper furnished. 5,000, $15; 10,000 $25. Cash with order. Service Printing Company, Little Falls, New Jersey. Write today. Printers for two generations. Reference, Little Falls National Bank.

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BEST Lowest Priced Printing on earth. Economic Specialty Co., Leonia, N. J.

CAREFUL printing, promptly done. Litchfield Printing and Stationery Company, Litchfield, Ill.

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GOOD Printing at low prices. 1,000 good letterheads, envelopes, cards, billheads, labels, circulars, $2.75 to $3.50. Samples free. Catalogues, booklets and circulars our specialty. Ernest L. Fantus Co., 523 S. Dearborn St., Chicago.

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NAME Card style sheet sent on request. Star Press, Winchester, New Hampshire.

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BLADES Sharpened by Our New Process —Double Edge—Sharpening Service, Finest in America. Two-Edge Blades 50c Dozen; One-Edge, 38c. "Tuttledge," Indianapolis, Ind.

RAZOR Blades re-sharpenel, 2½ cents each. An edge that satisfies. Blade Shop, Bible House, Room 115AH, New York City, N. Y.

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THE greatest line of Hard-to-Get Binoculars in the country at amazing low prices. Nu-Sight Binocular, $13.50; World-Famous LeMaire, $9.50; The Victory Binocular, $45.00 (made by Bausch & Lomb); Turner-Reich Binocular, $31.50; U. S. Navy Binocular, $37.50; High-Power Telescope, $14.75; Goerz Trieder Binocular, $37.50; Petit Binocular (made in France), $15.00; Genuine Carl Zeiss Binocular, $75.00; 18X Busch Trebix, the finest Binocular in existence, $150.00; Lumina High Power, $37.50; 8 Power Loma, $25.00; 7 Power Loma Binocular, $25.00. Send for your copy of our new catalog. Hundreds of similar values of standard merchandise. David Stern Company, "Value, Service, Satisfaction Since 1885," 1101 Davsco Bldg., Chicago, Ill.

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GOLDFISH, imported Japanese, Chinese and American goldfish. Artistic aquariums for beautiful homes. Pioneer Goldfish Hatchery, Catalog number 6, Racine, Wis.

UMAKEM! Men! Boys! Schools! Churches! Clubs! UmakeM! See page 211.

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CASH by return mail for discarded Jewelry, False Teeth, Crowns, Bridges, Magneto Points, Old Gold, Silver, Platinum. Our offer subject to your approval. Yonover Bros., 1637-P, West 12th St., Chicago.

WANTED—First class Specialty Line for Coast Trade. Sales, Box 633 Seattle, Wash.

WANTED—Modern mail order novelties. Submit particulars, prices. Paragon Company, Pacific Building, San Francisco, Cal.

WANTED to buy: War Souvenirs—Decorations, German—Belgian—English—French—Italian—Austrian. Collector, 207 Barth Bldg., Denver, Colo.

WANTED — 3-inch or larger Telescope with Astronomical Eye-Piece. Mark Love, Durant, Miss.

SMALL Factory or machine shop to take very profitable novelty work. Drake, Lock Box 2117, Philadelphia.

WANTED—Advertising firm who handles the placing of Classified Ads; furnish list. Emory Thomas, Box 78, Wichita Falls, Texas.

WANTED — Tire Vulcanizer and Air Compressor. Costello, Box 287, Philadelphia.

HIGHEST Cash Prices Paid for Discarded Gold Jewelry (old or new), Gold Crowns, Bridges, Watches, Magneto Points, Diamonds, Platinum and Silver. We also pay up to $35.00 per Set for Old False Teeth (broken or new). Packages returned at our expense if our offer is refused. United States Smelting Works, Dept. 71, Chicago, Ill.

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$2,000 FOR 10 acre alfalfa-potato gov't irrigated farm in Lower Yellowstone Valley. Fourth cash, balance ten years. We operate if desired. Invest now and become independent. Schaefer & Newlon, Fairview, Montana.

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CALIFORNIA little farms near Los Angeles for sale on easy terms. Write E. R. Waite, Shawnee, Oklahoma.

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Additional Classified Ads Page 52

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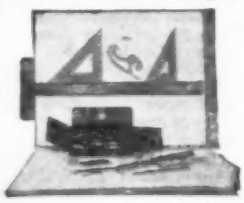

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Continued from Page 50

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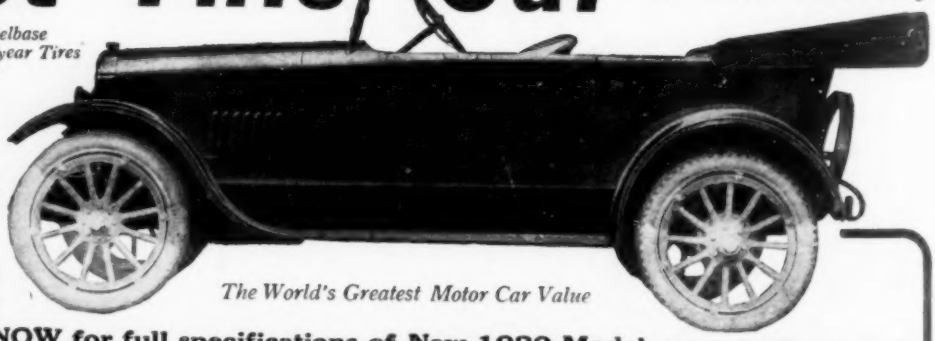

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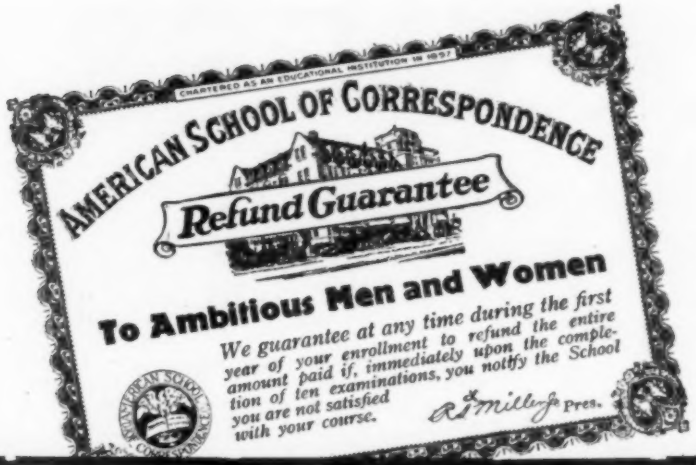

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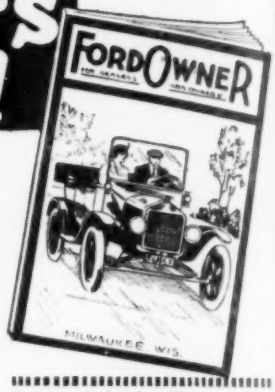

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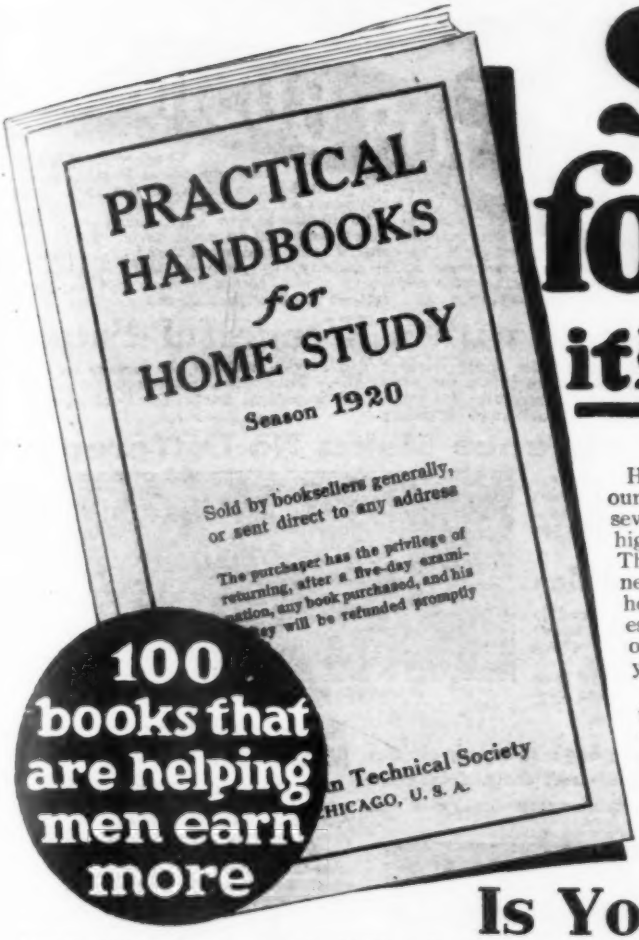

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Factories are rushed to the limit; garages and service stations are already crowded for the want of trained men to adjust and repair these thousands of machines. Competent men are wanted in every city and town for this vitally important work. Our Course teaches how to do this work—it fits you to command big money.

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Every city, town and village wants trained automobile and tractor men. Factories are constantly asking us for graduates; owners in towns and villages want to know where they can find competent men to take care of their machines.

We can't begin to supply the demand. Detroit trained men are given preference every time.

This is Our Mechanical Lecture Room where students are given their first lessons on automobile construction.

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Our Course is not made up of one man's ideas, it represents the combined experience of many,—it consists of the latest, newest and most practical ideas of the biggest men in the auto, truck and tractor business.

Our school enjoys the fullest co-operation with manufacturers, service stations, garages and owners,—a factor of vital importance to our students.

A. G. ZELLER,
President

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View showing part of the 25 motors in Block Test Department. All types are taught—2, 4, 6, 8 and 12-cylinder; sleeve-valve types, etc.

Our Students Stand Any Test

No test nor examination is too severe for graduates of the M. S. A. S. When you complete Our Course you will have no difficulty in passing any examination required by any State for automobile mechanics, chauffeurs, etc. No matter whether you go into business for yourself or take a position in an auto factory, garage or service station, our training will enable you to handle the work easily and successfully.

Auto Factories Endorse Our School

Because of the intensive training given our students, the biggest auto factories in the country heartily endorse our School. They know the thoroughness of our methods; the completeness of our equipment. They give us every assistance and co-operation possible. In fact they assisted in outlining our Course. They know the kind of graduates we turn out and are constantly calling on us for men.

A corner of our Repair Department where students receive their final tests before graduation.

DETROIT TRAINED MEN GET THE PREFERENCE

MICHIGAN STATE AUTO SCHOOL

"The Detroit Auto School" — *"In the Heart of the Auto Industry"*

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Many of Our Graduates go into business for themselves

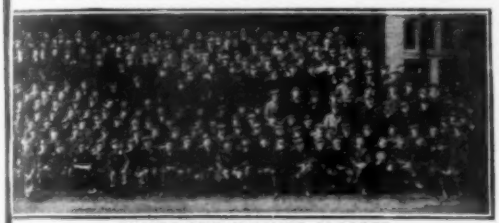
EARN $100 TO $400 MONTHLY

All over the country you will find M. S. A. S. Graduates operating garages of this type and larger.

There is no limit to your earning capacity after you have completed Our Course. Our instructions can be made the stepping stone to a most successful business career. The training you get here will fit you to hold positions which before were out of your reach. Here at the M. S. A. S. you are thoroughly instructed in every phase of the auto industry. You learn every part of the work by actually doing it—a training which enables you to step into the best paying positions in the business.

Unlimited Opportunities

Hundreds of our students go right from our School into business for themselves—something many of them never before thought possible. Our Course convinced them—and will convince you—that they had received a most valuable training—one that enabled them to place themselves in a profitable, money-making business. And these students are successful. They write us of having incomes way beyond their expectations. These men are located everywhere—in large cities, small towns and country districts. They are successful wherever automobile, truck and tractor work is needed because of the intensely practical training given them here at the M. S. A. S.



ONE OF OUR SUMMER CLASSES

Complete Training in Auto Electrics

This is one of the most important features of our entire Course. Our equipment for teaching auto electrics is one of the most complete in the business. We have equipment which explains the origin and use of every kind of electrical energy. Each student is fully instructed in the use of various electrical currents and how they are applied to automotive mechanics. This training enables the student to successfully handle any possible trouble which may develop in starting, lighting, ignition, generating, or battery systems. Remember this: Instructions in "electrics" alone is not enough. It requires a combination of "electrics" and "mechanics" if you would attain the practical in results. That's why our complete and unequalled Course in automobile mechanics, coupled with our complete and highly practical instructions in auto electrics, gives our students the training that is most vital—a training which absolutely insures success in the auto, truck and tractor business.

Electrical Demonstration Department where students are thoroughly instructed on Auto-Electrics. Every known type of starting, lighting and ignition system is included in our equipment.

Complete Tractor Course Included

You are also given complete instruction on the care and operation of Farm Tractors as a part of our regular Auto Course. The constantly increasing use of tractors has created a big demand for trained tractor men. Manufacturers have placed machines with us for the purpose of giving our students the benefit of practical instruction along these lines.

Tractor operators, repairmen and salesmen have a wonderful future ahead of them. There is need for them all over the world.

Our Students' Welfare Department

This work is in charge of Mr. S. W. Maxwell who devotes his entire time to looking after the personal interests and comfort of our students. No matter what you may want, be it of a personal or business nature, Mr. Maxwell is here to help you. And long after you graduate, he keeps in touch with you to render any help or assistance needed.

Money-Back Guarantee

We guarantee to qualify you for a position as chauffeur, repair man, demonstrator, auto electrician, garage man, automobile dealer or tractor mechanic and operator paying from $100 to $400 monthly in a reasonable time, **or refund your money.**

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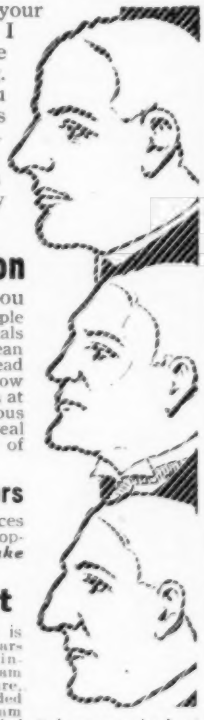
Prof. Henry Dickson, Principal

Prof. Henry Dickson, foremost authority on Memory Training and founder of the Dickson School (Established 1900) offers you his new, practical course in Character Analysis.

Mail coupon below or send your name and address on a postal. I will then send you my complete course in Character Reading. Keep it five days. Then if you are not thoroly convinced of its inestimable value return it without expense. All I ask is that you follow a few suggestions and see for yourself how easy it is to read character.



A Priceless Possession

What would it be worth to you to know the true character of the people you meet! Every human face reveals certain characteristics. But they mean nothing to you if you are unable to read them quickly and accurately. I show you how to "size up" men and women at a glance—how to penetrate the various guises they assume to mask their real character—how to be the master of every situation.

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Do you realize there are hidden forces within you capable of wondrous development? ***Let me show you how to make the most of yourself.***

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My course in Character Reading is founded upon solid facts gained from years of practical experience. I have been instructor in many leading Universities and am Fellow of the Society of Arts and Literature, London, England. Twenty years ago I founded the Dickson School of Memory and am still principal of that institution, which is today recognized as the most thorough and practical system of memory training.

Mail Coupon Today!

I want you to examine this course wholly at my risk. Send no money. Just mail the coupon. The complete course will be sent to you by return mail. Judge its merits by the amount of practical benefit you obtain during the five days it is in your possession.

If you then decide to keep it, send me $3. This includes **my personal instruction and a complete analysis of your own character.**

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Prof. Henry Dickson, 421 Hearst Bldg., Chicago

Without obligation to me, send me your complete course in "How to Read Character." If I decide to keep it I will send you $3.00 within 5 days. Otherwise I will return the lessons in good condition.

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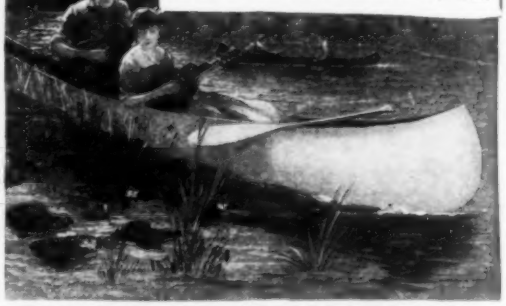

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Stage Work and Cabaret Entertaining successfully taught by mail. Your opportunity to enter fascinating, money-making profession—to travel—see the world—as vaudeville actor or actress. My simple, easy, complete Professional Course—only one of its kind—**COVERS ALL BRANCHES.** Develops **Personality, Confidence, Skill,** and tells you **just how** to get on the Stage. Send 6c postage for big booklet, **"All About Vaudeville."** Give age and occupation.
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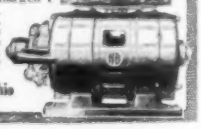
READ WHAT ANOTHER H B USER SAYS ABOUT H B PROFITS:

Maxwell Garage, Lovington, Ill., (Pop. 1,000) writes, "Average income $40.00 to $50.00 a week. Expense for current, $10.00 per month. Your HB machine has made an increase in my battery business that I did not think could be done even in two years' time. $40.00 a week isn't bad profit, is it?"

This HB 500 Watt Charger Can Bring YOU Also Big Profits This Winter



Small cash payment, balance on easy monthly terms. HB Absolute Money-Back Guarantee. Recharges 1 to 8 6-volt batteries for 10c to 15c each, customer pays 75c to $1.50. No burnouts, no expensive renewals; steady, reliable service. Easy to install and operate. No electrical knowledge required. Pin this ad to your letterhead and mail TODAY for information.

Hobart Brothers Co., Box M122, Troy, Ohio
Successful Manufacturers Since 1893

Why He Earns $30,000 a Year

By Victor Jones

Who Improved His Memory in One Evening

Here is perhaps the most remarkable story of memory power—and what it will do to land a man ahead in business—that I have run across since I learned, to my own great advantage, the secret of a better memory from David M. Roth, the famous memory expert.

It is the true experience of two clerks in New York City who started together, side by side, at the modest salary of $12 a week.

I have the facts straight from John Wesley, one of Mr. Roth's most successful pupils, who began his own business career in the same office with the two clerks, Powers and Weeks, whose story I am going to tell you.

I shall give it in Wesley's own words—as nearly as I can recall them—adding that he himself, at 32 years of age, has risen to the Treasurership of one of the best known corporations in New York City.

"Powers," said Wesley, "developed an accurate memory. Weeks was always forgetting. Powers with his dependable memory proved himself invaluable to his employers. He got on amazingly. He was always being pushed ahead. A raise in salary was to him a fixed semi-annual event.

"Facts and figures he had at his finger tips. He could always be counted on to do anything he was told because his employers found that they could **count** on him—he always remembered.

"Weeks, poor chap, was just the opposite—he was never sure of anything. He always 'guessed' or 'thought,' but never seemed to know.

"The man with the memory is now, a few years later, the head of a giant publishing enterprise with a handsome interest in the business and a salary of $30,000 a year.

"The man who could **not** remember is now collecting petty advertising bills for a New York newspaper. His salary is about $20 a week.

"You see the success of Powers and the failure of Weeks were largely due to one's remarkable memory and the other's inability to remember.

"I am sure this is the answer, because I had an opportunity to observe both men at close range in their daily work."

The Sequel

I saw Wesley five months later and as we were talking about the extraordinary success of the Roth Memory Course I recalled the case of Powers and Weeks.

"That's funny," said Wesley, "Do you know I ran into Weeks only yesterday in Times Square and you never saw such a change in a human being. He is in a fine new position and is going ahead fast.

"I always believed he had good stuff in him if he ever found out how to use it—but I never dreamed he would get on his feet in five short months; for the last time I saw him he was about the sorriest spectacle you can imagine.

"And to what do you think he attributes his new grip on himself?

"Nothing more or less than the Roth Memory Course, which I sent him in the hope that it would bring him to.

"Not only has Weeks **found** his memory but he has become keener and more observing. He says it is a wonderful feeling to be sure of his facts, as Mr. Roth's lessons have taught him to be.

"He says he is getting to remember faces and names about as easily as his A B C's and the same with telephone numbers and street addresses and business statistics.

"Weeks may never catch up to Powers, because he let his fellow clerk get a pretty big lead, but I am certain that in another year he will be miles ahead of the point at which he would have been had he not learned from Mr. Roth how to use the perfectly good memory that his recent experience with the Roth Memory Course proves beyond question he possessed all the time."

VICTOR JONES.

For obvious reasons Mr. Jones has substituted the names Powers, Weeks, and Wesley for the real names of the gentlemen mentioned in this story.

* * * * *

David M. Roth began with a poor memory himself. He says that, more than anything else, was what set him to cultivating his own memory and working out the wonderful Roth System which has been responsible for so many thousands of improved memories all over the United States.

Mr. Roth actually could not remember a man's name twenty seconds after being introduced to him.

Yet today there are probably 10,000 people or more in the United States whom Mr. Roth has met at different times—most of them only once—whom he can name instantly on sight.

The accounts of Mr. Roth's amazing memory feats have been published in newspapers all the way from Seattle to New York. He goes into a banquet room or lecture hall and after being introduced to fifty or sixty people turns his back while they change seats. He then picks out every one by name and tells him his telephone number and business connection—for good measure. As Mr. Roth says, there is nothing miraculous about this. Anyone can do it and the other apparently "impossible" things that so astonish Mr. Roth's audiences.

A Better Memory in One Evening

Mr. Roth's System, which he has developed through years of study, has been put into a course of seven fascinating lessons, so easy that a twelve-year old child can learn them—yet so effective in their improvement of the memory that hundreds of business executives all over the country—by their own testimony—consider the Roth Course well nigh priceless to them.

Read this letter from Terence J. McManus, of the firm of Olcott, Bonynge, McManus & Ernst, Attorneys and Counsellors at Law, 170 Broadway, and one of the most famous trial lawyers in New York:

"May I take occasion to state that I regard your service in giving this system to the world as a public benefaction. The wonderful simplicity of the method, and the ease with which its principles may be acquired, especially appeal to me. I may add that I already had occasion to test the effectiveness of the first two lessons in the preparation for trial of an important action in which I am about to engage."

Mr. McManus didn't put it a bit too strong.

A single evening spent on the first lesson will give you the secret on which the whole Roth System is based. In that first evening you should easily double your memory power.

Just think what it will mean to you to have twice as good a memory. H. Q. Smith, Manager of the Multigraph Sales Company of Montreal, says:

"Here is the whole thing in a nutshell: Mr. Roth has a most remarkable Memory Course. It is simple, and easy as falling off a log. Yet with one hour a day of practice, anyone—I don't care who he is—can improve his memory 100% in a week and 1000% in six months."

And we could show you hundreds of other letters similar to Mr. Smith's—received in the last month alone. After a few hours with Mr. Roth's Course you will be amazed and fascinated at the new sense of confidence and power that will be yours.

You will be freed forever from the artificial memory tricks to which most of us have been slaves.

You will learn to remember instantly

Names and Faces	Statistics
What You Read	Facts
Speeches You Hear	References
Talks	Sermons and Lectures
Business Details	Business Reports
Selling Points	Good Stories
Legal Points	School Lessons
Conversations	Household Duties
Pictures	Business Appointments
History and Dates	Social Engagements
Streets and Numbers	
Business Figures	

And you will find it, not hard work as you might suspect, but just as much fun as playing an absorbing game. For Mr. Roth makes the act of remembering an easy, natural, automatic process of the mind.

Send No Money

Don't send a single penny. Merely fill out and mail the coupon. By return post, all charges prepaid, the complete Roth Memory Course will be sent to your home.

Study it one evening—more if you like—then if you feel that you can not afford to keep this great aid to more dollars—to bigger responsibilities—to fullest success in life, mail it back to the publishers within five days and you will owe nothing.

Mr. Roth's fee for personal instruction to classes limited to fifty members is $1,000 but in order to secure nation-wide distribution for the Roth Memory Course at the time above all others when Americans need all the self-improvement they can get, the publishers have put the price at only $5.

If a better memory means only one-tenth as much to you as it has to thousands of other business men and women, mail the coupon today—NOW—but don't put it off and forget—as those who need the Course the very worst are apt to do. Send the coupon in or write a letter now before the low introductory price is withdrawn.

FREE EXAMINATION COUPON

Independent Corporation

Publishers of The Independent Weekly

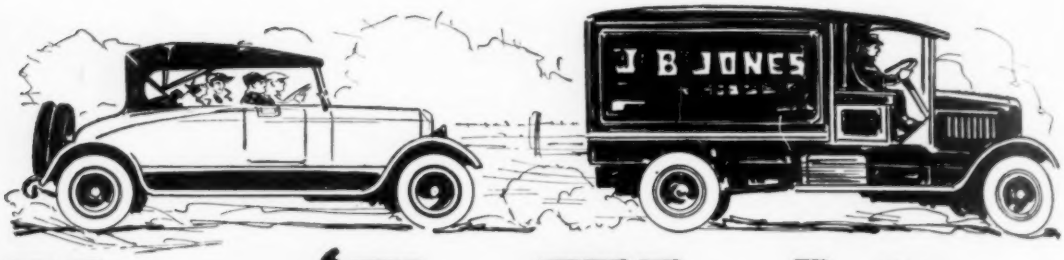
Dept. R4512, 119 West 40th St., New York

Please send me the Roth Memory Course of seven lessons. I will either remail the course to you within five days after its receipt or send you $5 in full payment of the course.

Name.....

Address.....

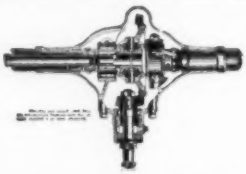
.....Pop. Mech. 12-19



Keep 'Em Working

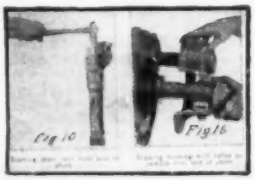
Some of the Things Featured in Oct. Issue

Rear Axle Care and Maintenance



This article tells about the importance of rear axles; the different types and kinds; how they operate; common axle trouble—their causes and cures; how to lubricate; bearings and gears; care and adjustments; the right and wrong way to make repairs, etc. Written so anyone can understand and apply it. That's why the Auto Digest is such a practical magazine for the autoist.

"Brass Tacks" for Repairmen



This is an intensely interesting article of value to any owner, garageman or repairman. Fully illustrated with 20 different cuts, of which two are shown above greatly reduced. The down-to-earth practical manner in which these articles are written is one reason for the growing popularity of the American Auto Digest.

It is extremely valuable to know just what to do to keep your machine in good running order all the time. A slight adjustment here; a little timely attention there, often means the difference between pleasurable and satisfying results and lost time, money and patience.

Thousands of Auto, Truck and Tractor owners and drivers are constantly bothered with puzzling motor problems. Just at a time when their machine is needed most, it positively refuses to work, and—"What to do?"—"Where to locate the trouble?"—"How to fix it?" are common questions that are puzzling. Practical answers, easily understood, are continually being published in the

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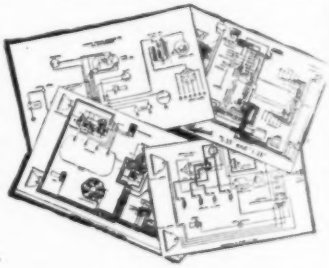

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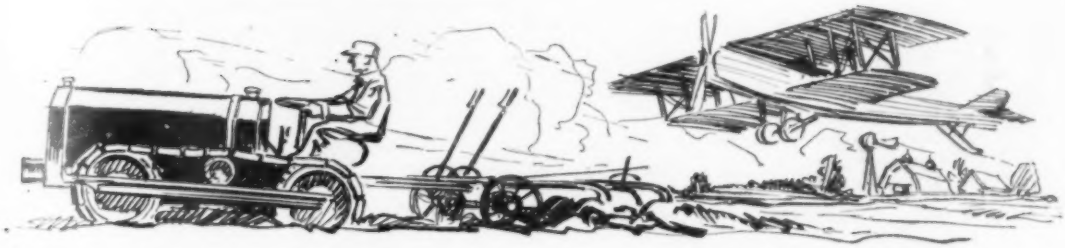

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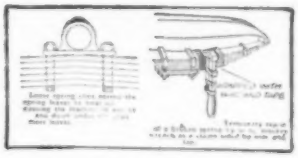
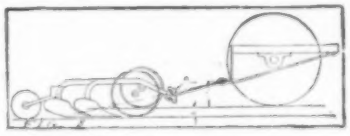
Tips on What You'll Find in the November Issue

Motor Car Springs



Here is an article every Autoist should read. Springs are an important part of an auto and too much care can not be given the subject. A little timely attention often saves big expense and this article shows how easily that attention can be given. Fully illustrated. When you've read it you will know why we claim such exceptional value for The Auto Digest.

Hitching Up the Tractor Plow



Tractor operation is a subject of growing importance, hence the timeliness of this article. As you will see from the reduced illustration, we handle it in a most practical manner and give some valuable information of interest to tractor folks. Motor Auto Digest progressiveness.

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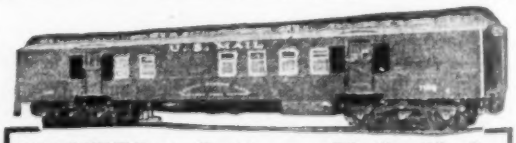

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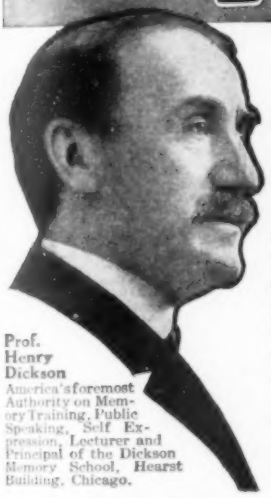

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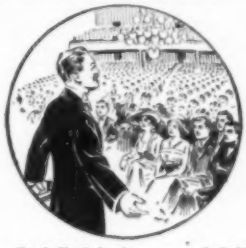

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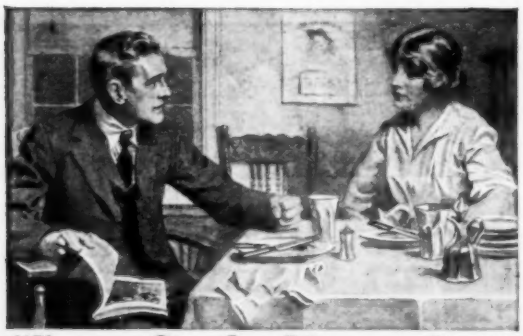

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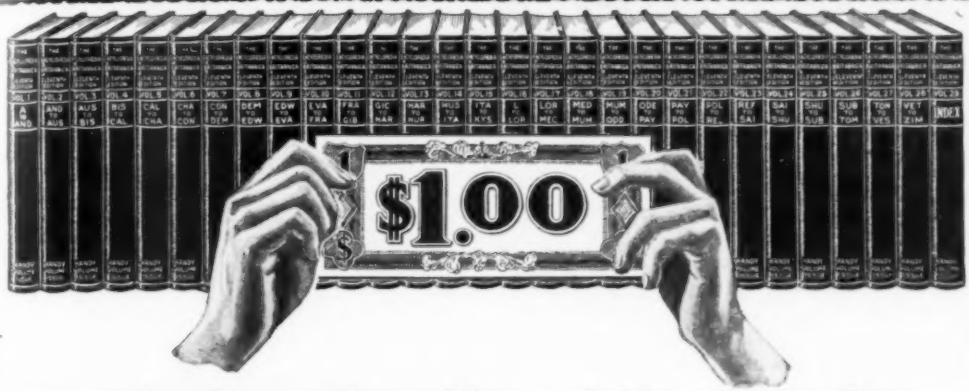

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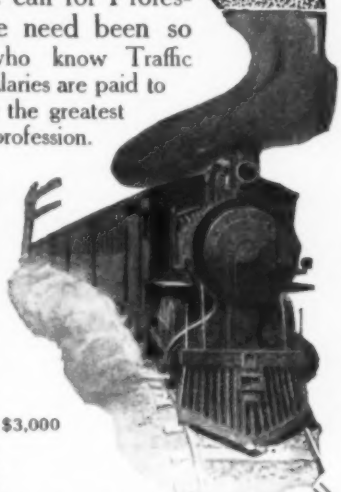

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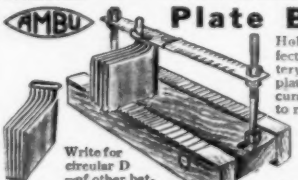

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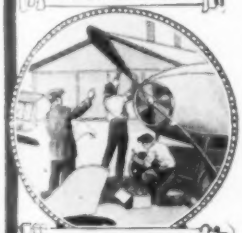

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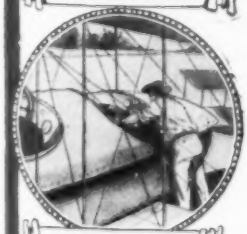

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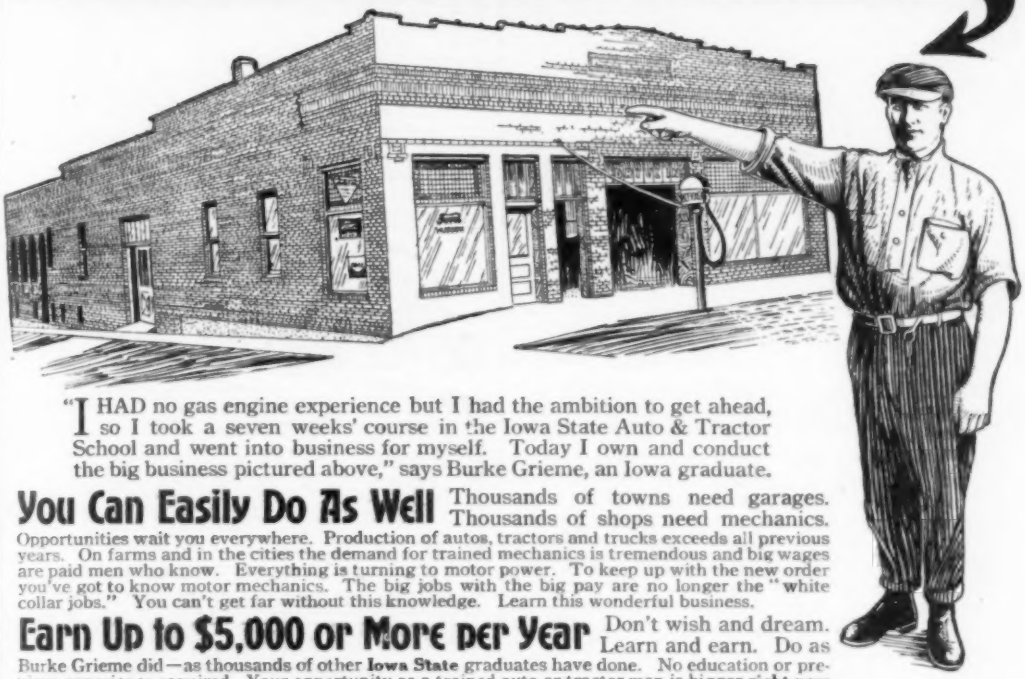

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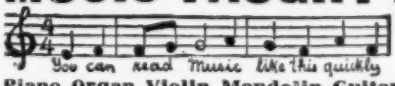

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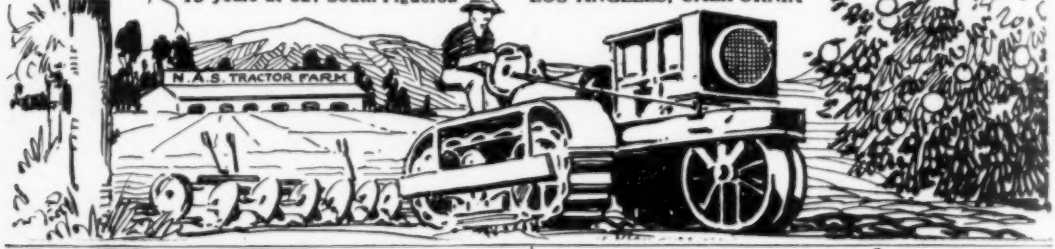

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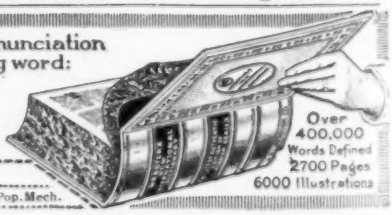

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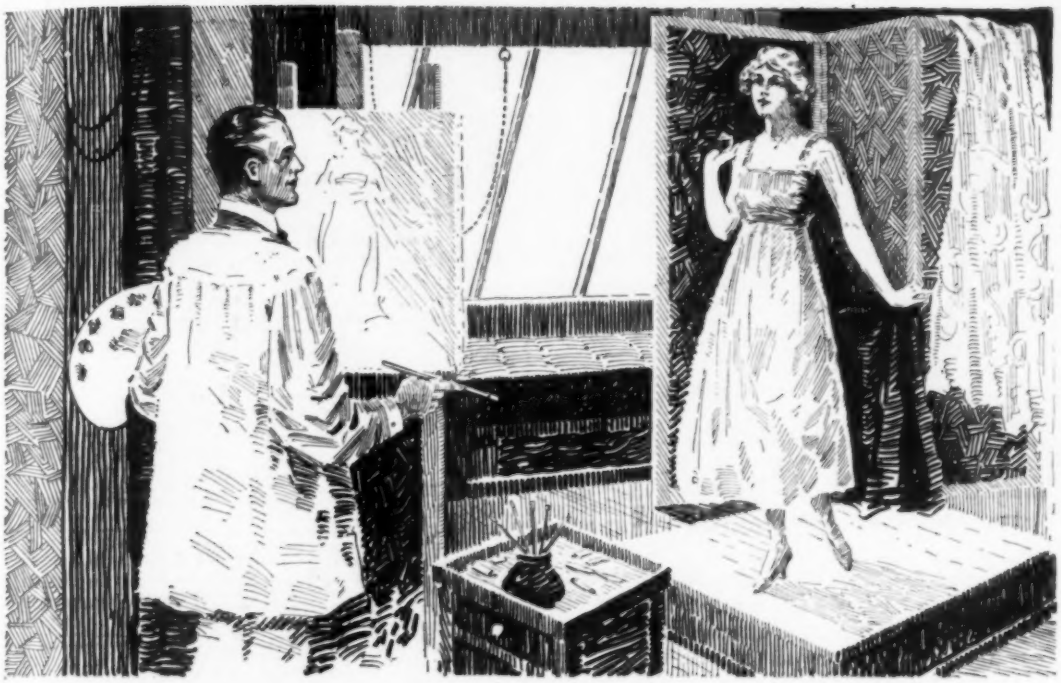

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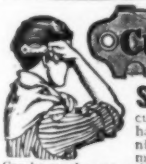

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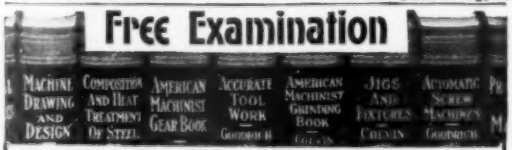

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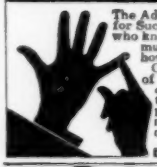

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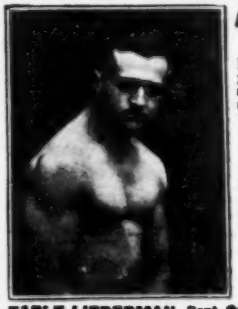

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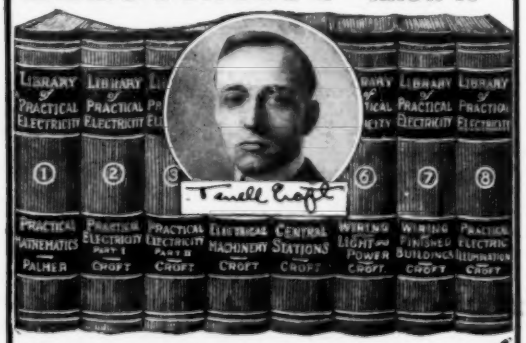

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Tire Repair Equipment Co., Appleton, Wis., manufacturers of Badger Shop Vulcanizers, Badger Boilers, Burners and Equipment for Shop Vulcanizers announce a complete change in their sales policy. Heretofore, their product was handled mostly through the jobber. The 1920 policy will be to sell direct. The company will work toward the establishment of Tire Repair Shops all over the world equipped with Badger Repair Equipment and known as Badger Service Stations. Every buyer of Badger equipment will be given a thorough course by mail or at the factory repair shops and after completion will be entitled to a Badger Service Station Certificate. A strong National Advertising Campaign will be conducted which will create a demand for tire repairing the Badger way. The new catalog of 1920 Models will be ready for Distribution after Nov. 15th, showing a new line of air bag and solid pad equipped plants and a new combination machine which will make a great change in the Tire Repair Methods of today. The Badger is the only machine using the Scheurle Attached Sliding Hinged Clamp. A complete description of the new Models will be shown in later issues of the leading publications. *Send for catalog and full details.*

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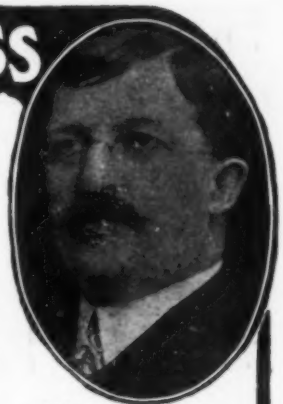

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Each student enrolling for our complete Course is given a complete working Outfit entirely FREE. No additional supplies are needed except drawing paper. Every tool you will need in the work is included in this FREE OUTFIT.

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We guarantee to successfully teach you the Sign-Show Card Business and fit you to qualify for a position paying from $25.00 to $75.00 Weekly when you have graduated. We have constantly more requests for men at big salaries than we can fill.

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Earn $25 to $100 Weekly

The opportunities are unlimited. Our graduates are fully qualified to handle the most difficult jobs possible. Their training enables them to fill good paying positions. They are qualified to handle every kind of tire-repair job. Our Course teaches the latest and best methods of tire reconstruction. You are taught to do the class of work for which car owners are willing to pay the best prices. Our graduates are easily able to earn from $25.00 to $100.00 weekly—many do even better.

Our Course Complete and Practical

It covers every phase of the tire business. Students are fully instructed in the growth, production and handling of raw rubber and how it is made into tires. Every type and kind of tire is carefully studied and you are shown how each kind is best repaired. Every process is made plain and simple. You are thoroughly familiarized with the best repair shop methods known. Every possible feature is covered to insure your best success in the work.

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We guarantee to thoroughly teach our students the Tire Repair Business and fully qualify them to go into business for themselves or hold positions paying from $25 to $100 weekly, or refund the tuition money. The demand for trained graduates constantly exceeds the supply.

Our Graduates in Demand The thoroughness of our methods are widely recognized. We are continually asked for graduates who can fill responsible positions; take charge of repair shops or open up places of their own when there is need for trained services.

Write Today. Get Free Book Gives complete information on our Course. Shows how students are taught—the thoroughness of our methods—the wonderful results possible. Don't delay. Get started in this money-making business NOW!

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Tobacco Redeemer contains no habit-forming drugs of any kind and is the most marvelously quick, absolutely scientific and thoroughly reliable remedy for the tobacco habit.

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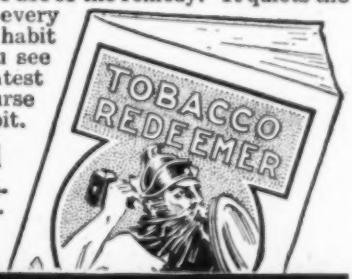
Tobacco Redeemer is in no sense a substitute for tobacco, but is a radical, efficient treatment. After finishing the treatment you have absolutely no desire to use tobacco again or to continue the use of the remedy. It quiets the nerves, and will make you feel better in every way. If you really want to quit the tobacco habit—get rid of it so completely that when you see others using it, it will not awaken the slightest desire in you—you should at once begin a course of **Tobacco Redeemer** treatment for the habit.



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A single trial will convince the most skeptical. Our legal, binding, money-back guarantee goes with each full treatment. If **Tobacco Redeemer** fails to banish the tobacco habit when taken according to the plain and easy directions, your money will be cheerfully refunded upon demand.

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.....High School Graduate	.....Stenographer
.....Fire Insurance Expert	.....Gen'l Education Course
.....Sanitary Engineer	.....Com. School Branches
.....Heating and Ventilating Engineer	.....Electrical Engineer
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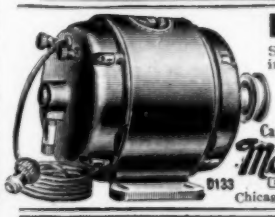

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131-40	66
141-50	69
151-60	71
161-70	73
171-200	75

FEMALE

Average weight pounds	Maximum normal height inches
98-115	60
116-25	62
126-35	64
136-45	67
146-55	69
156-66	71

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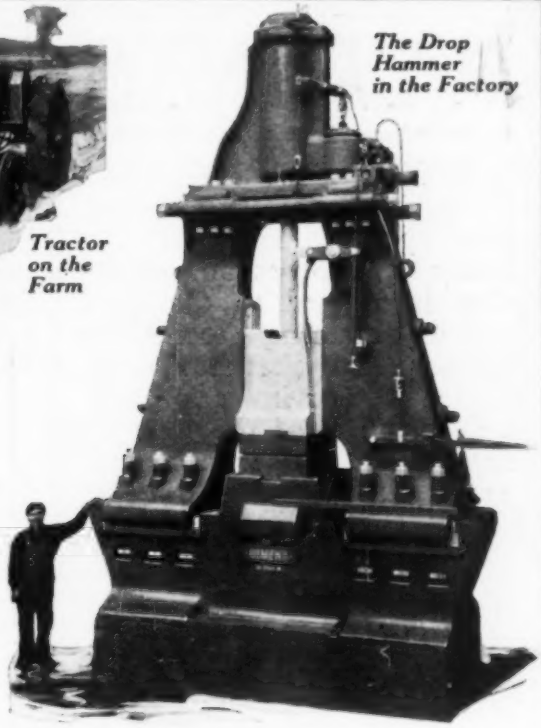
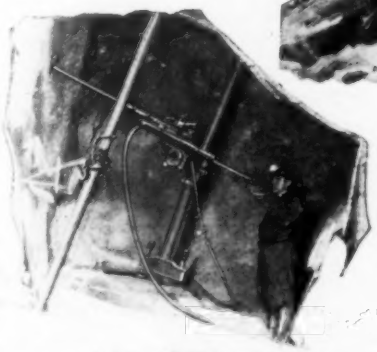


The Drop Hammer in the Factory



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The possibility of finding a market for new toys is of very great interest to this office because the life of the toy industry depends largely upon the development of new merchandise and the improvement of old.

NEW TOYS

The best field for invention is the development of entirely new items. It is impossible for me to indicate what kind of a toy would be most apt to succeed as new articles of all kinds are in demand. Mechanical and electrical toys, clever wooden toys and novelties are always needed. Toys with which the children can do something are wanted at the present time.

SUGGESTIONS

One of the best ways to get ideas is to walk through toy departments at the holiday season and notice the kind of articles in which the children are interested. Absolutely new stuff, totally different in appearance, is the kind which succeeds.

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The inventor must, of course, always have in mind the fact that the general run of toys have to be produced to sell at a moderate price. They must, therefore, be as simple as possible and require little hand work in assembling.

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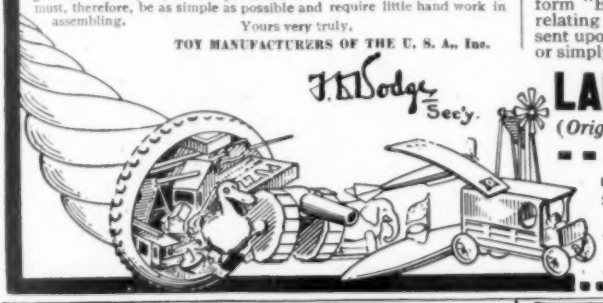

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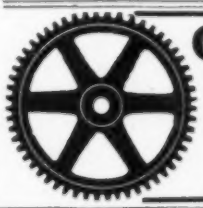

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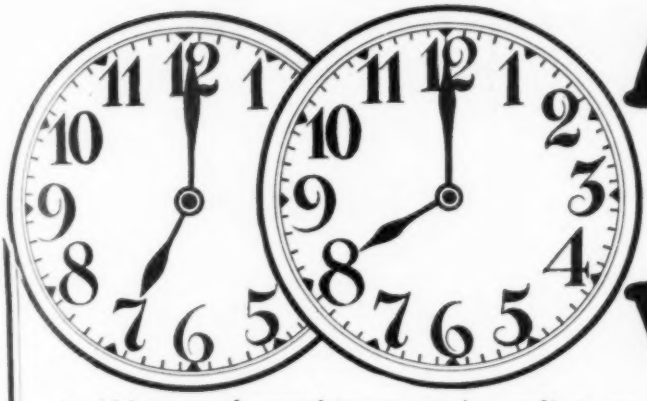

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"The time will come," writes the same authority, "when millions of people will be writers—there will be countless thousands of playwrights, novelists, scenario, magazine and newspaper writers—they are coming, coming—a whole new world of them!" And do you know what these writers-to-be are doing now? Why, they are the men—armies of them—young and old, now doing mere clerical work, in offices, keeping books, selling merchandise, or even driving trucks, running elevators, street cars, waiting on tables, working at barber chairs, following the plow, or teaching schools in the rural districts; and women, young and old, by scores, now pounding typewriters, or standing behind counters, or running spindles in factories, bending over sewing machines, or doing housework. Yes—you may laugh—but these are The Writers of To-morrow.

For writing isn't only for geniuses as most people think. *Don't you believe the Creator gave you a story-writing faculty just as He did the greatest writer?* Only maybe you are simply "bluffed" by the thought that you "haven't the gift." Many people are simply afraid to try. Or if they do try and their first efforts don't satisfy, they simply give up in despair, and that ends it. They're through. They never try again. Yet if, by some lucky chance they had first learned the simple rules of writing, and then given the Imagination free rein, they might have astonished the world!

But two things are essential in order to become a writer. First, to learn the ordinary principles of writing. Second, to learn to exercise your faculty of Thinking. By exercising a thing you develop it. Your Imagination is something like your right arm. The more you use it the stronger it gets. The principles of writing are no more complex than the principles of spelling, arithmetic, or any other simple thing that anybody knows. Writers learn to piece together a story as easily as a child sets up a miniature house with his toy blocks. It is amazingly easy after the mind grasps the simple "know how." A little study, a little patience, a little confidence, and the thing that looks hard turns out to be just as easy as it seemed difficult.

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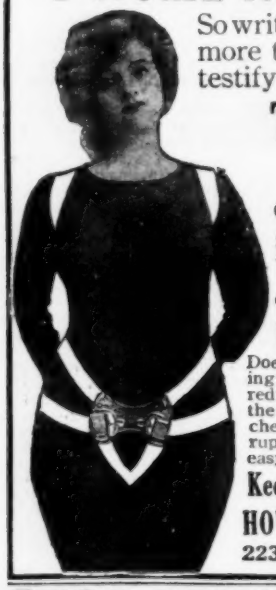

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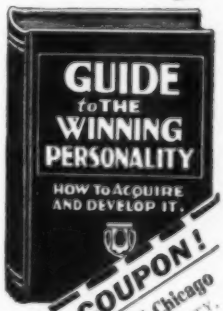
This Talk is Only For Men Who Want to Enter the GET-THERE Class

You know—everybody knows—that the men in the other class never get anywhere. They are apt to be found sitting on the SIDE LINES in the great game of life, trying to decide *for themselves* whether it's LUCK, PULL, ACCIDENT or MONEY that permits some men to climb so high up on the ladder of success. But big, successful men—like Frank A. Vanderlip—would say that while the elements of luck, pull, accident or money might have some bearing on the matter, the man with THE WINNING PERSONALITY was the one who made the greatest success in the struggle to get there, and win the favor of the world and the higher-up jobs. He said one time, in answer to the question how he picked men, "A WINNING PERSONALITY is the first thing I look for in a man."

A man who had so many men under him should know how important this trait is in a man who has his way to make in his journey success-ward, as most men have. He would tell you also that this is something that is born in every man. It is only waiting to be brought out, providing he starts right. And to be sure of the right start, we say to you, send for that amazing book

Guide to THE WINNING PERSONALITY

and read it carefully. You will say it is the most fascinating, the most intensely interesting and profitable book that ever came into your hands. You will hate to lay it down. Just a simple request will bring a copy to you, quickly.



Some of the Topics

- What is a magnetic personality?
- Winning Ways
- The Secret of Leadership
- The Value of Attractive Personality
- The Cultivation of Personality
- The Knowledge that is Power
- The "Awakening of the Will"
- Physical Poise and Carriage
- The Way to Carry Yourself
- The Secret of Grace in Walking
- Psychological Effect of Good Carriage
- The Way of the Gentleman
- The Little Things that Count
- How Some People "Queer" Themselves
- Lord Chesterfield's Advice
- The Value of an Attractive Voice
- Making Over One's Voice
- The Value of Effective Expression
- What Constitutes Strength and Force in Words
- The Person Who is Always Interesting
- Good Manners
- Advice of the Worldly Wise
- Personality Pointers
- Reading Personality in the Eyes
- How to Acquire the Winning Handshake
- The Secret of Obtaining the Confidence of Men
- General Advice to Student on How to Develop The Winning Personality

Send No Money The Coupon is Enough

This is the only plan we have of making the acquaintance of men of ambition—men of your calibre, at long range. Ask for this FREE BOOK now, TODAY. It's a little step to take, but one that leads to the goal of success, and YOU (and others) who are heading in that direction want all the worth-while help that's FREE.

Take this big step now—before you turn the page—*send for this Free Book!*

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FILL OUT THE FREE BOOK COUPON!

Advanced Thought Pub. Co., 159 No. State St., Dept. 1205, Chicago
Please send me your free book, Guide to The WINNING PERSONALITY, without obligation of any kind.

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"The Baby" Double Action Hammerless Revolver

A Handsome and Most Effective Weapon. Measures but 4¼ Inches Long. Takes Regular .22 Calibre Cartridges

$6.50

The new **Baby Double Action Hammerless Revolver** has been produced to meet the ever increasing demand for a revolver that would combine small size and right weight with the essential features of **Efficiency and Practicability.** It is small in size, yet is just as effective and serviceable as the most expensive weapon you can buy. Everyone should have a revolver and should know how to use it, and there is no safer or better one made than this. A great feature is its safety action that guards against accidental discharge, making it quite safe for young men and ladies. The illustration gives an idea of its appearance, but it must be seen and used to be thoroughly appreciated. The ammunition used is the standard 22-calibre cartridge obtainable anywhere. The operation of the charging mechanism is extremely rapid and absolutely reliable; six well aimed shots can be fired in as many seconds. The revolver is very well constructed, with finest nickel plated fluted barrel of cylinder, and it weighs only 4¼ ounces. **The price of the Baby Revolver is only $6.50 sent by mail, p.pd. to any address.**

MIDGET BIBLE

The Smallest Bible in the World

The Midget Bible is a perfect gem, and a work of art. It is about the size of a postage stamp and contains TWO HUNDRED PAGES of the NEW TESTAMENT. This little Bible is a wonder. It is said to bring good luck to the owner. Must be seen to be appreciated. **Price, only 15 cents, three Bibles for 40 cents; one dozen Bibles for $1.20; 100 for $7.50.** Good money selling Bibles.

JOHNSON SMITH & CO., Dept. PM13, 3224 North Halsted Street, CHICAGO

THE U.S. BABY TANK

It goes with real Yankee Pep—by its own power

MADE OF METAL, IN CAMOUFLAGED COLORS OR GRAY

Most remarkable Toy ever invented. By drawing the Tank backward, either with the hand or over the floor or table and then placing it down, it will crawl along, overcoming all obstacles, in the same lifelike manner as the larger Tank that proved so deadly in the great war. What makes it go is somewhat of a mystery, for there is no mechanism to wind up as is usually understood with mechanical toys, yet this tank will keep plodding along ten times longer than the ordinary run of toys. It will perform dozens of the most wonderful stunts; it will go backward or forward at will, and altogether will give you more fun and amusement than any other toy yet brought out. 2¾ inches long. Each packed in colored box. **Price only 35 cents prepaid, three for One Dollar, or $3.00 by the dozen, postpaid** to any address in the world. **Johnson Smith & Co.**

MAGIC FLUTE

Wonderfully Sweet Toned and Musical

Post Paid 15c

A marvelous musical instrument. No other instrument produces sweeter music, whether it be the joyous notes of a quick-step or the solemn strains of a church hymn—in fact, any class of music can be played upon the Humanatone without practice, as it is almost a self-playing instrument. When played with a piano accompaniment, or any other musical instrument, the effect is charming.

Good Luck Ring

Quaint and Novel Design

A VERY striking and uncommon ring. Silver finish, skull and crossbone design, with two brilliant, flashing gems sparkling out of the eyes. Said by many to bring Good Luck to the wearer, hence its name, **Good Luck Ring.** Very unique ring that you will take a pride in wearing. **ONLY 25 CENTS.**

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Make Your Watches, Clocks, Etc., Visible by Night

The very latest discovery in the scientific world. Hitherto, practically unobtainable except at an exorbitant price, we have at last succeeded in producing this remarkable LUMINOUS PAINT, which, applied to the surface of any article, **emits rays of white light, rendering it perfectly visible in the dark. THE DARKER THE NIGHT, THE MORE BRILLIANT IT SHINES.** Quite simple to use. Anyone—you can do it. A little applied to the dial of your watch or clock will enable you to tell the time by night. You can coat the push buttons or switch plates of your electric lights, match boxes, and innumerable other articles; make your own Luminous Crucifixes, Luminous Rosaries, etc. Small bottle, **price 25c.** Larger sizes, **50c** and **$1** postpaid.

Mystic Skeleton

10c pd.

A jointed figure of a skeleton 14 in. in height, will dance to music and perform various gyrations and movements while the operator may be some distance from it.

Serpent's Eggs

Box contains 12 eggs. When lit with a match, each one gradually hatches itself into a snake several feet long, which curls and twists about in a most lifelike manner. **Price per box, 10c ppd.**

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All the Latest Surprising and Joke Novelties

Pharo's Serpents Eggs, box	10c	Mesmerized Penny (defies the law of gravitation)	20c
Miniature Water Pistol	15c	Mysterious Tumbler and Vanishing Coin Trick	25c
Cleopatra's Snake (very lifelike)	15c	Magic Mirror (take one peep)	10c
False Mustache (fool your friends)	6c	Magic Plate Lifter	20c
Automobile Puzzle (Latest)	20c	Imitation Gold Teeth	8 for 10c
Mysterious Ghost, shines at night	10c	Great Burglar Puzzle	10c
Rubber Razor (very formidable)	20c	Wire Puzzles, 10c., 22 different,	$1.95
Rubber Dagger (sensational)	20c	"Elec-Trick" Push Button	10c
Window Smashers (great joke)	25c	Inkless Pen (writes with water)	10c
Lookbackroscope (see behind you)	15c	Imitation Bed Bugs	10c
Great Mind Reading Mystery Cds.	10c	Squirt Ring	20c
Thurston's Mysterious Trick Cds.	10c	Trick Bill Book	10c
Fighting Roosters, pair	10c	Acquaintance Cards (witty and amusing)	10c
Cover the Spot Trick, a selen. sov.	10c	Glass Watch	25c
X Ray Novelty	10c	Multiplying Billiard Ball Trick	25c
Trick Pencil	10c		
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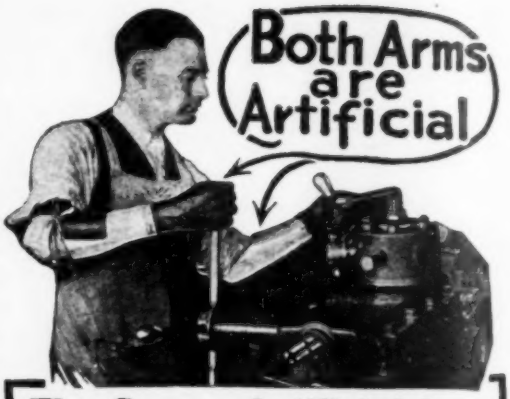

The Carnes Artificial Arm

has enabled Edward Finnegan, 413 Olive St., Kansas City, Mo., to continue his work as a skilled mechanic, altho he has lost both arms. His earning power is the same, his efficiency practically as high. To see him work or on the street, you would never think that both arms were artificial. This is because the Carnes Artificial Arms which he wears are inconspicuous, natural in appearance, strong and serviceable.

The Carnes Arm is totally unlike any other. It is the only arm that is practical and useful, and at the same time does not proclaim itself as being artificial. Its wearers are able to continue their ordinary occupations, wait on and care for themselves.

Catalog Free We will cheerfully send you our catalog, which fully explains the Carnes Artificial Arm and shows by actual photographs how Salesmen, Mechanics, Farmers, etc., are able to use it in their regular occupations. Write for a copy today.

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208 Carnes Bldg., 904 East 12th St., KANSAS CITY, MO.

"BOW LEGS and KNOCK-KNEES" UNSIGHTLY

SEND FOR BOOKLET SHOWING PHOTOS OF MEN WITH AND WITHOUT THE PERFECT LEG FORMS

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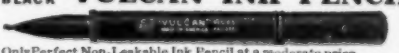
Erickson Artificial Limb Co., 38 Wash. Av. N., Minneapolis, Minn.

We are Under Govt. Bond

RED OR BLACK **VULCAN INK PENCILS** LONG OR SHORT



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Only Perfect Non-Leakable Ink Pencil at a moderate price. Your name in gold inlay 25c. FREE: Liberal supply of Ink with retail orders. Agents Wanted. Big profits. **J. C. ULLRICH & CO., 27 Thames St., NEW YORK**

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Sanitary and Odorless on ten days'

FREE TRIAL

NO MONEY DOWN—NO DEPOSIT

No more outside back yard inconveniences. No chambers to empty. No sewer or cesspool. Chemical process dissolves human waste in water. No trouble. Kills disease germs. Prevents flies, filth and bad odors of outhouse. A real necessity for old, young or invalids. Preserves health.

Costs 1 Cent a Week to Operate per Person

Place in any room, hall or closet. No trouble to install. Guaranteed sanitary and odorless. Endorsed by thousands of users, doctors, sanitary experts, health boards, etc. **AGENTS WANTED.**

Kawnear Cabinet Co.
876 Kawnear Bldg., Kansas City, Mo.

The Man Who *Wouldn't* Stay Down

He was putting in long hours at monotonous unskilled work. His small pay scarcely lasted from one week to the next. Pleasures were few and far between and he couldn't save a cent.

He was down—but he *wouldn't stay there!* He saw other men promoted, and he made up his mind that what they could do *he* could do. Then he found the *reason* they were promoted was because they had special training—an expert knowledge of some one line. So he made up his mind that *he* would get that kind of training.

He marked and mailed to Scranton a coupon like the one below. That was his first step upward. It brought him just the information he was looking for. He found he could get the training he needed right at home in the hours after supper. From that time on he spent part of his spare time studying.

The first reward was not long in coming—an increase in salary. Then came another. Then he was made Foreman. Now he is Superintendent with an income that means independence and all the comforts and pleasures that make life worth living.

It just shows what a man with ambition can do. And this man is only one out of hundreds of thousands who have climbed the same steps to success with the help of the International Correspondence Schools.

What about *you?*

Are you satisfied merely to hang on where you are or would you, too, like to have a real job and real money? It's entirely up to you. You don't *have* to stay down. You *can* climb to the position you want in the work you like best. Yes, you can! The I. C. S. is ready and anxious to come to you, wherever you are, with the very help you need.

Surely when you have an opportunity that means so much, you can't afford to let another priceless hour pass, without at least finding out about it. And the way to do that is easy—without cost, without obligating yourself in any way, mark and mail this coupon.

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BOX 5597-B SCRANTON, PA.

Explain, without obligating me, how I can qualify for the position, or in the subject, *before* which I mark X.

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- ☐ Mechanical Draftsman
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- ☐ Toolmaker
- ☐ Gas Engine Operating
- ☐ CIVIL ENGINEER
- ☐ Surveying and Mapping
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- ☐ Mathematics
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- ☐ ADVERTISING
- ☐ Window Trimmer
- ☐ Show Card Writer
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- ☐ Stenographer and Typist
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- ☐ Railway Accountant
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- ☐ CIVIL SERVICE
- ☐ Railway Mail Clerk
- ☐ AUTOMOBILE OPERATING
- ☐ Auto Repairing
- ☐ Navigation
- ☐ AGRICULTURE
- ☐ Poultry Raising
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Present Occupation _____
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Canadians may send this coupon to 7-26-19
International Correspondence Schools, Montreal, Canada

$100 TO 400 PER MONTH FOR AUTO AND TRACTOR EXPERTS

Learn at the School That is Thorough

You and every man or boy who is interested in automobiles, trucks and tractors can positively learn to be a motor expert at The Milwaukee Motor School. Why? Because this school is so thorough—the instruction is so simple and clear that anyone who wants to can learn this profitable trade here. For over eight years this big school has been successfully teaching boys, men and young men to be motor experts and today our efficient instructors can not be excelled for their ability to teach you anything you should know to earn big money as a motor-mechanic, chauffeur, garage owner, auto salesman, repair man, or factory worker.

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Men with years of experience in auto repairing and construction come here for advanced work—they have such confidence in our unusually thorough instruction. We make men experts. We have assured the success of thousands.

FREE Send for our free book and special offer NOW

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Please send me your free book and full particulars of your Free Tool Kit Offer.

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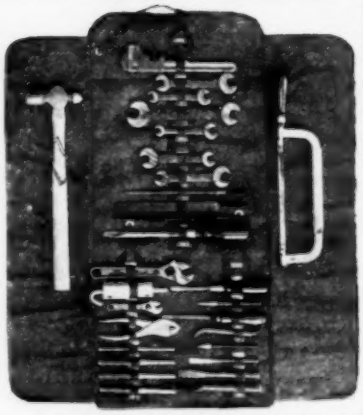
Free Tools



Special Offer

Everyone who enrolls now will receive a new kit of 29 tools without any charge whatever. These are not loaned but are actually yours to take home with you when you leave the school. There are no strings tied to this offer. This fine set of tools and kit bag are worth fully $17.50.

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Write To-day

Send for our new free book entitled "Making You Master of the Auto." Learn how we teach all the everyday problems concerning automobile and tractor engines—ignition, starting and lighting systems, magnetos, carburetors, etc. *Write today.*

MILWAUKEE MOTOR SCHOOL
Dept. 1199, 555 Downer Ave., Milwaukee, Wis.

Only $6.00 Down and $6.00 a Month

DIAMOND-LAKE 10-ACRE FARM, with two-room house, good well, purest water, 100 chickens, plenty small fruit, etc. Sand loam soil, not only good for fruits and vegetables, but for corn, potatoes, etc. All level, not much cleared, balance mostly pine and oak woods. Near **Diamond Lake,** with its many fine resorts, only 7 miles from White Cloud, the county seat, 4 miles from the R. R. at Ramona, Michigan, making good markets.

Price is only $565 with all improvements.

FEDERAL REALTY CO.
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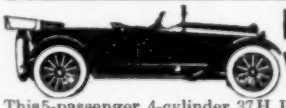
United States Cycle Tires are Good Tires

A tire for every need of price or use. Besides the Cord, which is the finest bicycle tire made, there are the Usco, Heavy Service Traction and Chain treads. Also tires for motorcycles.



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This 5-passenger, 4-cylinder, 37 H. P. BUSH Car—Timken Bearings—Willard Batteries—2-Unit Starting & Ltg.—116-in. whl. base. Write at once for the best Automobile Offer in existence—Don't wait—Cars guaranteed or money back—prompt Deliveries—now.

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Earn $25 to $100 Weekly

The demand for draftsmen today is enormous—and increasing. Vast engineering projects are being pushed as never before and draftsmen are at a premium. Enter this fascinating, well-paying business. Spend an hour or two every evening under our training and you will shortly be able to command draftsman's pay. Drawing outfit, books and blue-prints FREE. Students helped to secure positions when qualified. *Write for Catalog G.*

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Columbia Correspondence Schools
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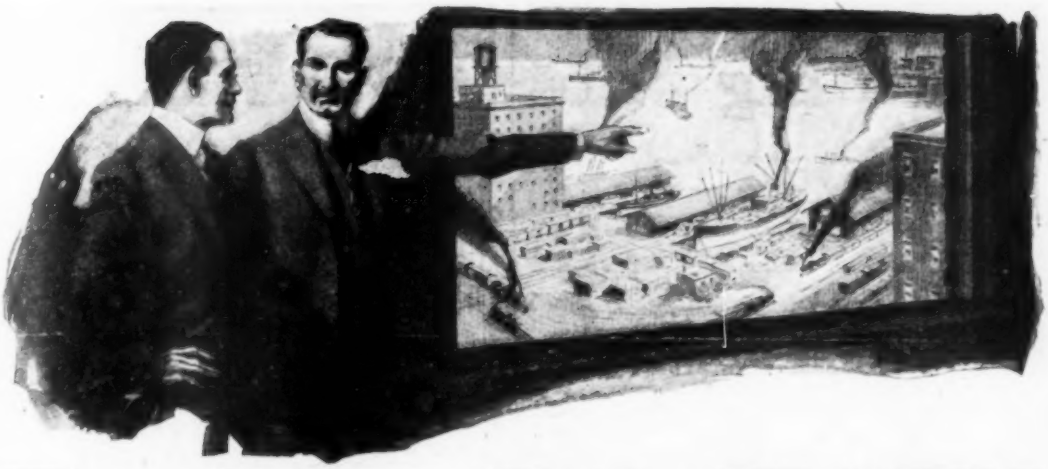

There Is Your Field—TRAFFIC

You need not look far for a chance to rise to a higher position—to make more money. When all great industries—manufacturers, railroads, steamship companies, packing houses, mills, mines, chambers of commerce, municipalities—are calling for traffic experts, you can take your place among the big pay men, if you will learn the ins and outs of Interstate Commerce—know how to direct shipments in vast volumes, by freight, express, parcels post.

Commerce is speeding up as never before. The United States must supply the world—which means carloads, train loads, ship loads, moving constantly. Not enough men are available who know rates, classifications, legal points and organization of traffic departments. The need is pressing today—tomorrow will bring a still more insistent demand. No reason why you should stand waiting for a chance. The chance is here. You need only the training to make you the man that these great shippers are looking for, willing, ready to pay you a high salary, to place you in a position of responsibility.

Train by Mail

Hold your present job. You can become a Traffic Expert in your spare time thru LaSalle training. Use your odd hours to capitalize yourself—to master a paying profession—to step far ahead quickly. Specialists are the men who win today—and Traffic is a specialized calling as yet uncrowded. Really no competition for the thoroly trained man—opportunities always open.

The LaSalle experts are ready now to give you this training—to make you a master of every vital point in traffic management. They will post you on the practical working of the methods used by leading shippers, instruct you in Interstate Commerce Law, show you how to figure rates, determine classifications and get the goods to destination at lowest cost. It's easy to see how any man can increase his earning power by getting this knowledge. You can pay the moderate fee, a little each month as you go along.

Note What These Men Have Done

Fred Hoffman's salary increased 500%, Harold Watson's report of 400% advance, R. W. Smallwood's two promotions, B. S. McMullen's rise from freight checker to General Freight Agent and hundreds of other successes made by LaSalle trained traffic men are all the proof needed that you too can push rapidly forward if you have this training.

LaSalle has already helped over 160,000 men to be better business specialists. Every year its experts train 30,000 ambitious men for higher positions. Many great American corporations employ LaSalle men in responsible positions. The Pennsylvania R. R. has over 2100, American Telegraph & Telephone Co. 811, B. & O. R. R. 946, Standard Oil Co. 390, while scores of others employ from 50 to 100 LaSalle trained men.

Mail Coupon — Get the Facts

Catalogs, information about the opportunities in Traffic and detailed facts about LaSalle training are ready to be mailed the day your request arrives. Send the coupon or write a letter. No obligation upon you is implied. This information is given freely. And we will also send, without cost, "Ten Years' Promotion in One"—the book that has been an inspiration and help to thousands of ambitious men. It may be a great help to you, too. Just tell us where to mail it.

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"The World's Greatest Extension University"

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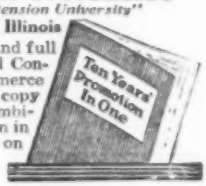
Please send me your catalog and full information on your Course and Consulting Service in Interstate Commerce and Traffic Management. Also a copy of your valuable book for the ambitious man, "Ten Years' Promotion in One." This without obligation on my part.



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Address.....

Present Position.....

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The wheels of peace-time industry never turned faster than they do to-day. Reconstruction work in Europe and expansion in foreign trade are taxing America's transportation facilities to the breaking point. Great factories are straining machine and man to supply the products for world-wide trade. Our ships are racing the seas by night and day and railroads speeding feverishly to haul the goods to market. Traffic Men—trained, with expert knowledge—are needed to guide and direct this great flow of traffic through the quickest, least costly routes.

Earn Big Salaries

Men trained in Regulated Transportation and Shipping, who can efficiently and economically direct transportation from inland cities to the markets all over the world, can almost name their own salaries. There never was a more opportune time to enter this fascinating, high salaried profession. The man who knows about the intricate Rules and Laws of Interstate Commerce, about demurrage, service, routing, classifications, marine insurance, etc., can save his firm thousands of dollars in shipping charges. That's why he is paid big money.

Manufacturers, jobbers, ship owners and railroads are all calling for efficient traffic men. For every hundred needed, only one is available. It is an uncrowded calling in which ambitious men may rise to enviable success.

You Train at Home in Spare Time

You can qualify at home, in spare time, for one of these big positions. The American Commerce Association—a national organization of traffic experts—will teach you while you hold your present job. Men skilled in every phase of traffic work will train you step by step. They will equip you with a thorough knowledge of Rates, Classifications, Routings, Claims, Demurrage, Ocean Traffic, Regulation and Management, Interstate Commerce Rulings, etc., etc. Under their guidance, you will master traffic problems with ease and accuracy. In addition to this, privilege is granted members to consult with the Association's Traffic Advisory Council, composed of many of the foremost Traffic Managers and Railroad Men of the country.

The Cost Is Small

The cost of the Training is remarkably small. Many members have more than paid for it from immediate increases in earnings. If you desire, you may enroll under our easy payment plan—a little each month, only a few cents a day. No ambitious man but can afford it.

Write for Free Book

"Opportunities and Requirements For Traffic Work" is a little volume that explains this exceptional training service in detail. It names the personnel of this great organization of practical traffic men. It recites many stories of striking success of men who have taken the work. It teems with facts of absorbing interest to those who determine to leave behind the crowd of smaller men and rise on up to success and happiness. If you seriously want to earn a salary of $2,500 to $10,000 a year or more, you will delay not a moment in sending for this valuable book. Write now. Only action wins! Postponements usually end in post mortems! In writing, state your age, present occupation and whether or not you have had previous traffic experience. Address: American Commerce Association, Dept. 1012, 206 South Wabash Ave., Chicago, Ills.

Who Kicked The First Goal In America?

Get it right! Don't be a goof when you talk about football. Let 'em know you know who kicked the first goal in America, who made the first touchdown, who put the scrim in scrimmage, who lost the first ear in the history of the sport—and why they call it a sport. Half the fun in watching a game of football is in letting folks hear you knock the plays. So draw up alongside the December number of

CARTOONS MAGAZINE

and read a lot of facts about the origin of football, and why no Thanksgiving is complete without a list of casualties as long as the Democratic ballot in Baton Rouge. The article is written by Malone Farrel, and will be found on page 895.

Hep yourself to Malone's chatter and see how wise you'll feel

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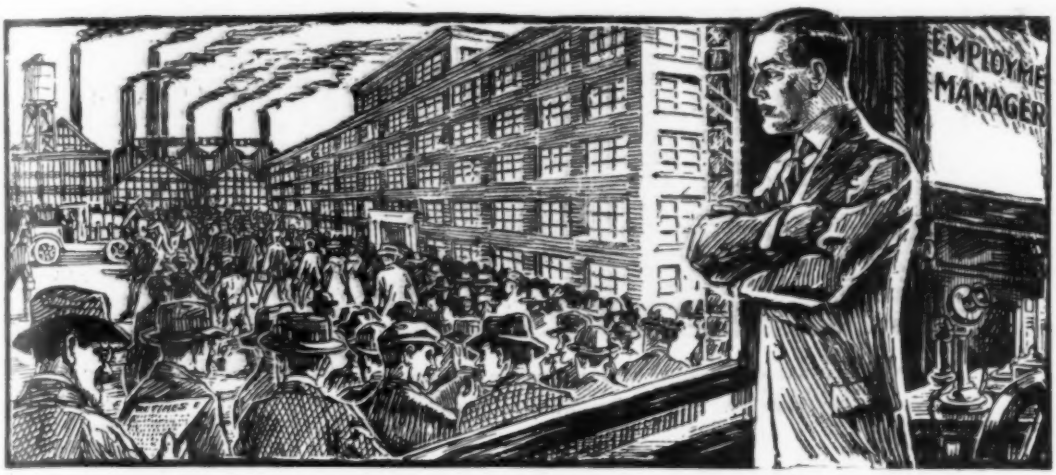
Name .....

Address .....



It's EASY to HIRE—
—but COSTLY to FIRE

WHEN leading industrial experts a few years ago came out with facts and figures to prove that it cost anywhere from $25.00 to $1,000.00 to replace a trained worker—that indiscriminate hiring and firing was a waste of human material and profits—that employment functions vested entirely in departmental heads was costly—and that conservation of man-power was not only economical but an efficiency factor, the employer began to think and to figure with the result that centralized employment departments came into existence—thereby creating a new profession—employment management

The Employment Manager's Big Problem

The employment manager does not earn his salary simply by hiring, but by reducing the number of misfits and quits. Therein lies his big problem. To maintain a stable working force he must, by judicious selection, find the right man for the right job for the right boss. He must know the requirements of these jobs and how to keep round pegs out of square holes. This demands an intimate knowledge of departmental requirements and an understanding of labor policies. He must buy his help with just as much care as the purchasing agent buys raw material. Employment management today is a study of human engineering. It is a real man's job.

Expert Help for Employment Men

With the approval and co-operation of many of the leading industrial concerns, employment managers and safety engineers, the American School of Correspondence has prepared EMPLOYMENT MANAGEMENT AND SAFETY ENGINEERING.

This course, which has been endorsed by Manufacturers and Employment Associations is now off the press and ready to help you solve your problems in this field.

EMPLOYMENT MANAGEMENT AND SAFETY ENGINEERING represents the result of over two years investigation and intimate study of every phase of employment and safety. Scores of plants all over the country provided valuable data, proved plans, methods and systems.

The course offers you nothing but EXPERIENCE. The knowledge to be gained from it would take years to acquire—because it stands for years of practical experience, investigation and research.

A Practical Reading Course

EMPLOYMENT MANAGEMENT and SAFETY ENGINEERING comprises a total of over 1500 pages—including a large and valuable collection of employment forms, charts, statistical tables, half-tone illustrations and engravings, and is neatly bound in flexible binding. It presents proved facts; not theories; discusses plans and policies frankly, but without bias; and gives concrete and practical information on such important problems as follows:

EMPLOYMENT MANAGEMENT:
The Employment Field—Organizing a Department—Functions and Personnel
Job Analysis
Safeguarding Selection
Training New Workers
Employment Forms
Labor Turnover
Sources of Labor
Systems and Policies
Personal Follow-Up
Collective Bargaining

MUTUAL RELATIONS: (including)
Personal Service Work
Lunch Rooms and Commissaries
Housing and Transportation Problems
Employe Representation
House Organs

INDUSTRIAL INSURANCE: (including)
Employes' Benefit Associations
Service Bonus Plans—Insurance Plans
Savings and Loan Club
Medical Service
Legal Phases
The 100% Employment Manager
The Employment Bibliography

SAFETY ENGINEERING.
The Human Element
The Accident Problem
Mechanical Guarding
Power Equipment
Gen. Eng'ring Features
Special Features

EMPLOYMENT MANAGEMENT and SAFETY ENGINEERING show how the plans and policies discussed can be applied to personnel problems in concerns employing any number of men from 500 up, and engaged in any form of industry.

Send No Money

There is only one way to appreciate the great value of EMPLOYMENT MANAGEMENT AND ENGINEERING, and that is to examine it yourself. Let us send it to you, without any cost or obligation on your part. Keep it SEVEN DAYS before deciding whether you can afford to be without it. Send no money—just fill in the coupon and mail it.

AMERICAN SCHOOL OF CORRESPONDENCE
Chicago, Illinois

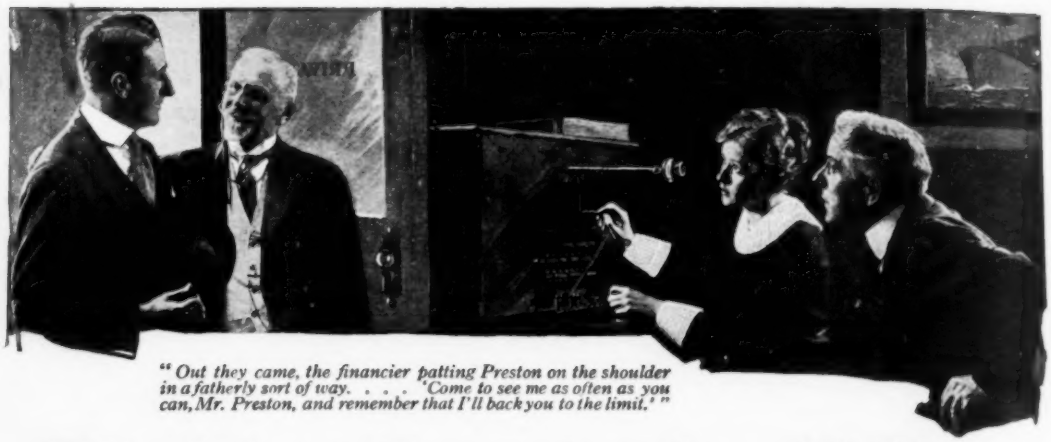
American School of Correspondence
Dept. E-749 Chicago, Illinois

Please send me your complete Seven Volume reading course on EMPLOYMENT MANAGEMENT AND SAFETY ENGINEERING for seven days free examination, shipping charges collect. If I decide to buy, I will send $10.00 within seven days after receipt of books, and $10.00 a month until the full price of $50.00 has been paid. Should I decide not to keep the books I will return them at your expense.

Name.....

Address.....

Occupation..... Age.....



"Out they came, the financier patting Preston on the shoulder in a fatherly sort of way. . . . 'Come to see me as often as you can, Mr. Preston, and remember that I'll back you to the limit.'"

The Most Convincing Talker I Ever Met

Everywhere this man goes, people shower him with favors and seek his friendship. Things which other people ask for and are refused, he gets instantly. How he does it is told in this amazing story.

LET me ask you this: There is a big business deal to be put through. It involves millions of dollars. Putting it through depends wholly on one thing—getting the backing of a great financier.

But this man is bitterly opposed to your idea and to your associates. Seven of the most able men and women in all America have tried to win over this financier. They failed dismally and completely.

Now, could you, a total stranger to this man, walk in on him unannounced, talk for less than an hour, and then have him take your arm as a token of friendship, and give you a signed letter agreeing to back you to the limit?

Could you?

ASTOUNDING? Yes! But it *WAS* done. And I'll tell you how. Here is the way it all came about. For a long time the directors of our company had felt the handicap of limited capital. We had business in sight running into a million dollars a month. But we couldn't finance this volume of sales. We simply had to get big backing, and that was all there was to it.

Because of trade affiliations, one man—a great financier in New York—controlled the situation. Win him over and the rest was easy. But how to win him?—that was the question. No less than five men and two women—all people of influence and reputation—had tried. They were all repulsed—turned down cold and flat.

You know how a thing of this sort grows on you and how bitter utter defeat is. Well, we were talking it over at a board meeting when one of our directors announced that he knew of only one man who could possibly put through the deal—a man by the name of Preston.

So it was agreed that Preston was to be sounded out at luncheon the following day. He proved to be a fine type of American. At 34 years of age he had become president and majority stockholder of a thriving manufacturing business rated at three-quarters of a million dollars.

Preston was deeply interested, as anyone would be over the prospect of closing such a big deal. The director in question said casually, "Why don't you run down to New York and take a shot at it, Preston?" Preston looked out of the window for a moment, and then quietly answered, "You're on."

I WENT along with Preston simply as a matter of form to represent our interests. Aboard the 10:25 train out of Chicago, we headed for the smoker and got to talking with the crowd there.

Then I noticed something. Preston had dominated them all. Everyone was eagerly hanging on his words, and looking at him with open admiration. No sooner would he stop talking than one of the men would start him up again. And as the men dropped off at stations along the way they gave Preston their cards, with pressing invitations to look them up. No doubt about it, Preston was *THE* man aboard that car.

The colored porter, too, came under his sway. For that night, when the berths were being made up, the porter came unasked to Preston, told him that his berth was right over the car trucks, and insisted upon changing it to a more comfortable one.

And so it went all the way to New York. Everyone who met Preston took a great liking to him the instant he spoke. They seemed to be eager for his companionship—wanted to be with him every minute, openly admired him, and loaded him with favors.

Even the usual haughty room clerk at the hotel showed a great interest in Preston's welfare. He showered us with attention while a long line of people waited to register.

The next morning we called on the great financier—the man who was so bitterly against us and had

flatly turned down seven of our shrewd influential representatives.

I waited in the reception room—nervous, restless, with pins and needles running up and down my spine. Surely Preston would meet the same humiliating fate?

But no! In less than an hour out they came, the financier patting Preston on the shoulder in a fatherly sort of way. And then I heard the surprising words, "Come to see me as often as you can, Mr. Preston, *and remember that I'll back you to the limit!*"

"At luncheon one of our directors said, why don't you run down to New York and take a shot at it, Preston?" And Preston answered, "You're on!"

AT the hotel that night sleep wouldn't come. I couldn't get the amazing Preston out of my thoughts. What an irresistible power over men's minds he had. Didn't even have to ask for what he wanted! People actually competed for his attention, anticipated his wishes and eagerly met them. What a man! What power! . . . Then the tremendous possibilities of it all—think what could be done with such power!

What was the secret? For secret there must be. So the first thing next morning I hurried to Preston's room, told him my thoughts, and asked him the secret of his power.

Preston laughed good-naturedly. "Nothing to it—I—well—that—is—" he stalled. "I don't like to talk about myself, but I've simply mastered the knack of talking convincingly, that's all."

"But how did you get the knack?" I persisted.

Preston smiled, and said, "Well, there's an organization in New York that tells you exactly how to do it. *It's amazing!* There's really nothing to study. It's mostly a knack which they tell you. You can learn this knack in a few hours. And in less than a week it will produce definite results in your daily work.

"Write to this organization—the Independent Corporation—and get their method. They send it on free trial. I'll wager that in a few weeks from now you'll have a power over men which you never thought possible . . . but write and see for yourself." And that was all I could get out of the amazing Preston.

WHEN I returned home I sent for the method Preston told me about. It opened my eyes and astounded me. Just how he had won over the financier was now as clear as day to me. I began to apply the method to my daily work, and soon I was able to wield the same remarkable power over men and women that Preston had. I don't like to talk about my personal achievements any more than Preston does, but I'll say this:

When you have acquired the knack of talking convincingly, it's easy to get people to do anything you want them to do. That's how Preston impressed those people on the train—how he got special attention from the hotel clerk—how he won over the financier—simply by talking convincingly.

This knack of talking convincingly will do wonders for any man or woman. Most people are afraid to express their thoughts; they know the humiliation of talking to people and of being ignored with a casual nod or a "yes" or "no." But when you can talk convincingly, it's different. *When you talk people listen and listen eagerly.* You can get people to do almost anything you want them to do. And the beauty of it all is that they think they are doing it of their own free will.

In committee meetings, or in a crowd of any sort you can rivet the attention of all when you talk. You can force them to accept your ideas. It helps wonderfully in writing business letters—enables you to write sales letters that amaze everyone by the big orders they pull in.

Then again it helps in social life. Interesting and convincing talk is the basis of social success. At social affairs you'll always find that the convincing talker is the center of attraction, and that people go out of their way to "make up" to him.

Talk convincingly and no man—no matter who he is—will ever treat you with cold, unresponsive indifference. Instead you'll instantly get under his skin, make his heart glow and set fire to his enthusiasms. Talk convincingly and any man—even a stranger—will treat you like an old pal and will literally take the shirt off his back to please you.

You can get anything you want if you know how to talk convincingly. You've noticed that in business ability alone won't get you much. Many a man of real ability, who cannot express himself well, is often outdistanced by a man of mediocre ability who knows how to talk convincingly. There's no getting away from it, to get ahead—merely to hold your own—to get what your ability entitles you to, *you've got to know how to talk convincingly!*

THE method Preston told me about is Dr. Law's "Mastery of Speech," published by the Independent Corporation. Such confidence have the publishers in the ability of Dr. Law's method to make you a convincing talker that they will gladly send it to you wholly on approval.

You needn't send any money—not a cent. Merely mail the coupon, or write a letter, and the complete Course, "Mastery of Speech," will be sent you by return mail, all charges prepaid. If you are not entirely satisfied with it, send it back any time within five days after you receive it and you will owe nothing.

Please send me Dr. Frederick Houk Law's "Mastery of Speech," a Course in Business Talking and Public Speaking in eight lessons. I will either remail the Course to you within five days after its receipt, or send you $5 in full payment of the Course.

Name

Address

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Shave a New Way

—Easier, Quicker, Pleasanter

Then Compare It With the Old Way

Facts such as these convince the home shaver that harsh, slow ways are no longer necessary. Shavaid, the new, soothing beard-softener, replaces annoying and harmful operations, saves time, gives new delight. To learn its merit, send for a Free Trial Tube.

HERE is a new, satisfying way to gain a comfort shave. A way now being adopted by men the nation over.

This welcome offering is Shavaid. It is a scientific preparation, perfected after countless experiments and tests.

It revolutionizes home shaving. It turns an irksome task into a refreshing pleasure. Once you try it you will never give it up.

It Saves All This

Shavaid saves hot water applications. It saves rubbing the lather in. It saves waiting for the beard to soften. It saves doctoring an irritated skin with lotion afterwards. It means a quick shave, an easy shave, a luxury shave. It avoids discomforts in a close shave. It does instantly what old shaving methods never could do at all.

If all this is so, you want it. You will never shave without it. No man abuses his face willingly.

Old vs. New

Simply coat the dry beard thinly with Shavaid, before applying lather. Note the cooling, soothing effect.

Shavaid

Softens the beard instantly
—apply to dry face before the lather.

Saves time and trouble
—no hot water, no "rubbing in" of the lather.

Protects the face
—skin remains firm and smooth

Removes the razor "pull"
—harsh ways age the skin prematurely.

Replaces after-lotions
—Shavaid is a cooling, soothing balm.

Note how the lather remains moist and creamy.

This way is quicker. Yet it protects the skin. Harsh treatments bring wrinkles too soon.

Hot water applications make the face tender and bring the blood to the surface. That causes abrasions.

With Shavaid, you can obtain a close shave without irritation. The Shavaid way keeps the skin firm and smooth.

The razor glides over easily.

And best of all, no lotions are necessary afterwards, for Shavaid is in itself a cooling, soothing, healing emollient. Its daily use keeps the cuticle in condition.

See If You Agree

We realize in introducing such an innovation that the quickest way for it to win its rightful popularity, is to hasten its use by as many men as possible.

So we offer here, via coupon, a Free Trial Tube. It contains sufficient Shavaid for a convincing test.

After using this Trial Tube, and agreeing that you do not want to be without it, you can then buy Shavaid from your druggist at 50c a tube.

If your dealer cannot supply Shavaid we will be pleased to fill your order direct.

B&B

Shavaid

At Druggists—50c a Tube

BAUER & BLACK, Chicago, New York, Toronto

Makers of Sterile Surgical Dressings and Allied Products

Free Trial Tube

BAUER & BLACK, Chicago, Ill. 22

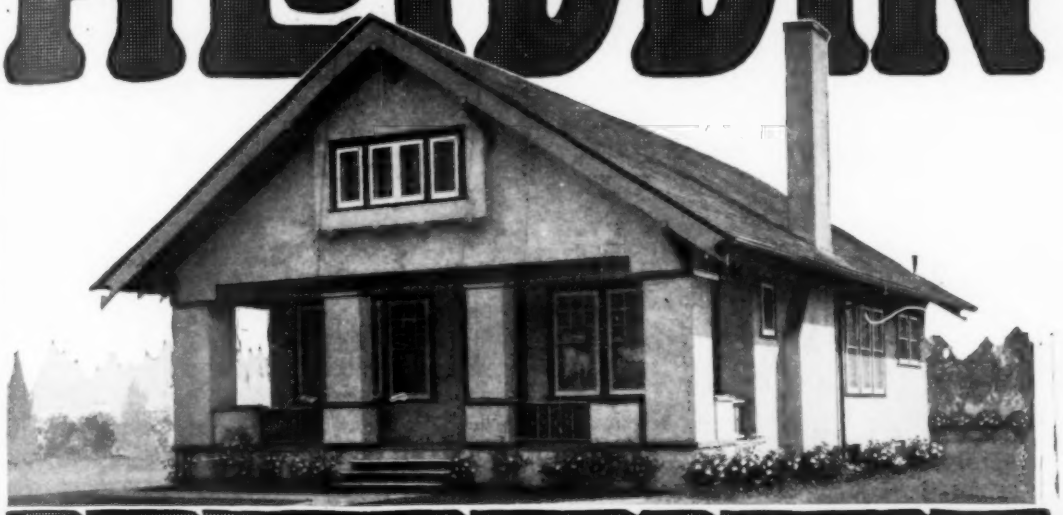
Mail free trial tube of Shavaid to

Name.....

Street Address.....

City..... *State*.....

ALADDIN



A Book For Homebuilders

Before you build, get a copy of the beautiful book "Aladdin Homes"—the most wonderful book ever issued for homebuilders. It pictures many homes—the most popular types—bungalows of California designs, attractive dwellings of one and two stories, summer cottages, garages, etc., complete with pictures of each, floor plans and descriptions. This book has an important message for every homebuilder. Get your copy today.

Avoid Waste When Building

The waste of lumber in building is 18%. Homebuilders can avoid throwing this 18% away. The book of Aladdin Homes shows how it is reduced to less than 2%—a saving to you of not less than $16.00 on every $100.00 of your building money. Thousands of builders have made substantial savings building Aladdin Houses—you have the same opportunity.

Aladdin Houses Will Save You Money

Aladdin Homes are sold direct to you—no dealers' profits. You buy direct from manufacturer and your complete house is shipped in one car by shortest route. Price includes all lumber cut to fit, millwork, doors, windows, lath and plaster, hardware, locks, nails, paints, varnishes, etc. Send stamps today for copy of the beautiful book "Aladdin Homes" No. 180.

Send stamps today for catalog 180

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968 Aladdin Avenue BAY CITY, MICH.

Canadian Branch: Canadian Aladdin Co., Ltd., C. P. R. Bldg., Toronto, Ontario

METHOD OF REPRODUCTION

Gives New Beauty to Record Music

"TONES that are reproduced truer, finer, sweeter." "Music that in both spirit and letter is restated with greater beauty." "All records transcribed with greater fidelity."

Golden opinions like these are showered on The Brunswick by its hearers everywhere. And why?

Because, with its many other betterments, it has an exclusive, new Method of Reproduction.

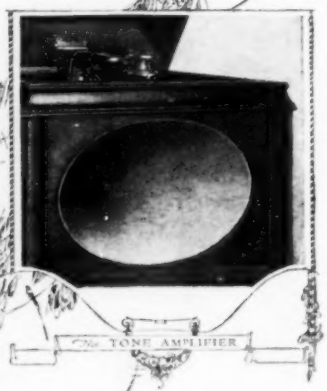
Method of Reproduction

This Method of Reproduction for which the Brunswick Phonograph is famous, includes two scientific features—the Ultona and the Tone Amplifier.

The Ultona

The Ultona—a new day creation—is a tone arm adaptable to playing any make of record.

With but a slight turn of the hand, it presents the correct weight, precise diaphragm, and proper needle.



The Tone Amplifier

The Tone Amplifier is the vibrant, all-wood throat of The Brunswick.

It is oval in shape and made entirely of rare moulded hollywood.

No metal touches it.

By it, sound waves are projected into full rounded tones—tones that are richer and more natural.

Brunswick Superiority is Apparent

Proof of the claims made by the many proud possessors of Brunswick Phonographs may be had at your nearest dealer. Ask to hear your favorite record played—TODAY.

Ask your dealer for a free copy of **"What to Look For in Buying a Phonograph."** You will want this interesting instructive booklet before you buy because it is authentic. It was written by Henry Purmort Eames, LL.B., Concert Pianist and Lecturer, Director Pianoforte Dept., Cosmopolitan School of Music, Chicago.

The BRUNSWICK-BALKE-COLLENDER Company

Branch Houses in Principal Cities of United States, Mexico and Canada

General Offices: 623-633 So. Wabash Ave., CHICAGO

Canadian Distributors: Musical Merchandise Sales Co., 819 Yonge St., Toronto

Removable *from* its base *for* continuous work

"YANKEE Vise"

Here's a Vise—"YANKEE" No. 1993—that in flexibility, convenience and capacity—(judged by its power to increase **your** output and quality of work)—is as different from other Vises as a flash of lightning from a sulphur match.

Now look! Suppose you have a job requiring various operations. First, you've got to "lay it off." Set your "YANKEE" Vise on the surface-plate and go to it! The "YANKEE" begins to help right there because bottom, top, sides and ends are machined exactly true. True with the jaws; true with the surface-plate; true with each other.

The "YANKEE" lifts off its base, work and all. You can take it in turn, to the drill-press, shaper, milling machine, emery-wheel, planer, perhaps set it in the lathe, vise and all.

Ordinarily, you must "true up" for each separate operation. Not so with the "YANKEE." Set your work true only once, and it stays set. No chance to go wrong.

"YANKEE" Vise

No. 1993, with Swivel Base . . . Price, $8.75
Set screw holds Vise to base; camthrow lever locks position. Body 7¼ x2¾ (wide) x3 in. Hardened steel faced jaws, open 3⅛ in.

No. 993. Same as No. 1993, but without Swivel Base . . . . . Price, $6.50

Your Dealer Can Supply You

Ask us to send you free "Yankee Tool Book" showing complete line of ingenious "YANKEE" Tools for modern efficiency work—bench, chain, breast and hand drills, wood-boring and screw-driving tools.

NORTH BROS. MFG. COMPANY, PHILADELPHIA

"YANKEE" TOOLS
Make Better Mechanics

The *new* Goodyear Motorcycle Tire has the Goodyear All-Weather Tread.

This tread is thicker, wider, tougher.

The sharp-edged diamond buttons come farther down on the side of the tire and skidding is lessened.

Because it is thicker and tougher than ever, the *new* Goodyear wears longer.

It is a fit mate of those Goodyear Tires that won the great bulk of all motorcycle races this year.

Ask for the *new* Goodyear—everywhere.

BUILD GOOD ROADS NOW
Work for good roads

Copyright 1919, by The Goodyear Tire & Rubber Co.

GOODYEAR

MADE IN U.S.A.

A Christmas present any real boy is proud to get

CHRISTMAS and a Winchester! What a combination for a real American boy!

Will this Christmas bring *you* a Winchester?

That's up to Dad.

Dad knows you want to shoot and he knows you ought to shoot. He'll get you your Winchester for Christmas if you tell him that's what you want.

How to get your Winchester

Ask Dad to take you to the store, and get the dealer to show you the W. J. R. C. Range Kit.

It's the very outfit boys have been waiting years to get — every shooting need provided for — any boy in the country would be proud to have it as a Christmas present.

Official outfit of the W. J. R. C.

With the W. J. R. C. Range Kit you, too, can now compete for the famous Winchester trophies — the Marksman, Sharpshooter and Expert Rifleman medals.

Lots of the boys you know have joined the Winchester Junior Rifle Corps and won these rewards of skill with the rifle.

You can do as well. Go to Dad to-day. Tell him you want the W. J. R. C. Range Kit as you have never wanted anything before.

Get Dad to go to the store with you. When he takes that shiny Winchester out of the Range Kit and fits it to his shoulder, he'll want it just as much as you do

Speak to him to-day!

Winchester Repeating Arms Co.
Dept. 1230, New Haven, Conn., U. S. A.

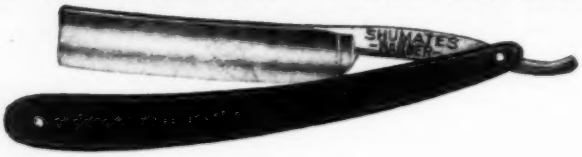
WINCHESTER

World Standard Guns and Ammunition

The new W. J. R. C. Range Kit includes everything you need for shooting — a .22 caliber Winchester rifle, a canvas gun case, ammunition, cartridge belt, cleaning rod, and three gun cleaning preparations — all packed in a handsome, durable case. The outfit also contains a supply of official targets and a copy of the W. J. R. C. rule book.

SHUMATE RAZOR

Written Guarantee with Each Razor



SHUMATE RAZORS are so good that we guarantee them for life. Here's the reason: The blade is made from tungsten alloy steel, which takes a keener edge than any other steel can—and holds it. You can use a SHUMATE for years without honing. The secret of this wonderful steel is ours alone, and we guard it jealously.

THE SHUMATE GUARANTEE:

Buy a SHUMATE RAZOR and use it, not only a few times, but as long as you like. If you decide after an exacting trial, that you don't like it, we'll exchange it for a new one without a word.

SHUMATE RAZORS represent the skill and knowledge acquired during thirty five years devoted exclusively to the production of razors. Two generations have used them.

$2. To settle the razor question for life, send us $2.00 and the SHUMATE Barber razor will be sent to you postpaid. For those with very strong wiry beards, we recommend our $3.00 SHUMATE RAZOR, specially ground for this purpose. In remitting, give us your dealer's name, and a chamois lined, rust-proof case will be included with your razor.

SHUMATE RAZOR COMPANY, 802 CHESTNUT ST. ST. LOUIS, U. S. A.

Established 1884 Capacity 10,000 Razors Daily

To All Men

Whose Teeth Do Not Stay White

All Statements Approved by High Dental Authorities

The Reason is a Film

Millions of men find that teeth brushed daily still discolor and decay. Tartar forms on them—tobacco stains appear. And with thousands pyorrhea gets a start.

That is evidence that teeth are not kept clean. Your methods are inadequate. You leave a film—that slimy film. It clings to teeth, enters crevices and stays. The tooth brush does not remove it all. The ordinary tooth paste does not dissolve it. So, night and day, it may do a ceaseless damage.

It Wrecks the Teeth

The film is what discolors—not the teeth. It is the basis of tartar. It holds food substance which ferments and forms acid. It holds the acid in contact with the teeth to cause decay.

Millions of germs breed in it. They, with tartar, are the chief cause of pyorrhea. Thus most tooth troubles are now traced to film.

Dental science, after years of searching, has found a film combatant. Dental authorities have proved its efficiency. Now it is embodied in a dentifrice, called Pepsodent, so everyone may use it every day. We urge you to ask for a free 10-Day Tube and see what it means to you.

A Pepsin Paste

Pepsodent is based on pepsin, the digestant of albumin. The film is albuminous matter. The object of Pepsodent is to dissolve it, then to constantly combat it.

Pepsin long seemed impossible. It must be activated, and the usual agent is an acid harmful to the teeth. But science has found a harmless activating method. Countless tests have proved this. And that method has made active pepsin possible.

You can see its effects. And, when you know the reason, can judge them for yourself.

Send the coupon for a 10-Day Tube.

Look in 10 Days

Let your own teeth decide the right method of cleaning.

Note how clean the teeth feel after using. Mark the absence of the slimy film. See how the teeth whiten as the fixed film disappears.

The question is all-important. White, clean, safe teeth are impossible with film. Cut out this coupon—learn the way to end it.

271

Pepsodent PAT. OFF. REG. U. S.

The New-Day Dentifrice

After five years of tests under able authorities, it is now advised by leading dentists and sold by druggists everywhere.

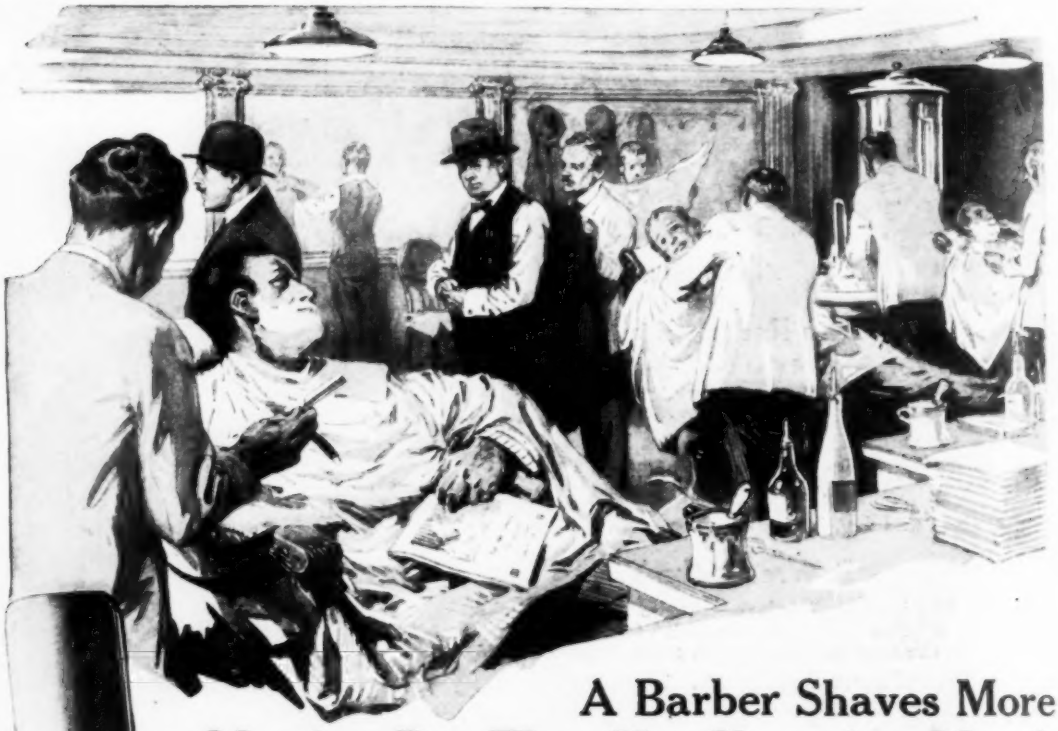
Ten-Day Tube Free

THE PEPSODENT COMPANY,
Dept. 845, 1104 S. Wabash Ave., Chicago, Ill.

Mail 10-Day Tube of Pepsodent to

Name.....

Address.....



A Barber Shaves More Men in a Day Than You Shave in a Month

HAVE you noticed that all barbers use just one type of razor—the Genco type? Some men deny themselves a regular razor because they imagine that stropping a regular razor is an Art or the trick of a skilled hand. 200,000 barbers don't. They simply buy razors built to strop.

Anybody Can Strop a GENCO Razor

It's built to strop. It has a broad back; its blade is hollow ground; and right behind that thin, keen edge is a slight bevel. Back, hollow-grinding and bevel, all three help to set its edge against the strop at exactly the correct angle. A few light strokes, and you have the smoothly cutting edge all barbers recognize the need of having.

Save the time and money that every barber does. A barber shaves hundreds to your one, but—you shave over 300 times a year.

Drop in on your dealer. Look for the three features mentioned. Every GENCO Razor is hand-forged and hand-ground from special steel. That's necessary because of our guarantee—"GENCO Razors must make good or we will."

If your dealer hasn't GENCO Razors, we will supply you

Geneva Cutlery Corporation
49 Gates Ave., Geneva, N. Y.

Largest Exclusive Manufacturers of High-Grade Razors in the World

Genco RAZORS

Reg. U. S. Pat. Off.

Note how Genco Razors meet the strop in just the proper way to assure a perfect shaving edge. The bevel lends backbone to the edge and guides it on the strop.

Extraordinary Coat Values!

CHASE

FURWOVE

BLACK BEAR COATS

DON'T think because fur coats are costly that you will have to go without a good, warm, rich-looking coat this winter. These wonderful coats—***Furwove Black Bear,***—have the merits of fur—carefully manufactured material made at our own mills, and then skillfully tailored under our own supervision in our own factories. Note that we have been leaders in manufacturing since 1847.

Don't hesitate to grasp this opportunity. These coats represent far more value than any words can tell. You can readily compare a ***Furwove Black Bear*** coat with any wool or fur coat. It will meet every test and will make you wonder how we can sell them at only **$35.00.**

FEATURES

Inexpensive: No luxury tax; $35.00 is low for any kind of a coat to-day.

Durable: A specially woven foundation holds fibres in place—no splitting apart like the pelts of fur—wove in one piece.

Sanitary: No odor arises after exposure. Different from fur in this respect.

Warm: ***Black Bear*** coats are made so that they afford protection like the coat of fur given Arctic animals by Nature—wind doesn't penetrate.

Rich Appearing: Beautiful, soft surface, and full lining all carefully tailored, carry a wealth of appearance.

Reputation: Backed by our national reputation—known since 1847.

The severest of weather can be faced in a ***Furwove Black Bear*** coat—turn up the deep collar, and you are protected from shoes to hat—a big coat that protects both your body and pocket-book.

Remember the big features—exceptionally low priced, only **$35.00.** Different sizes from 36 up.

Beautifully tailored, rich-looking garments with our label of protection sewn in every one. Don't accept substitutes!!

L. C. CHASE & CO., BOSTON

NEW YORK DETROIT CHICAGO SAN FRANCISCO

Leaders in Manufacturing since 1847

L. C. CHASE & CO., 89 Franklin St., Boston

Please send me Black Bear Coat. Size.....

I understand I can change size if necessary.

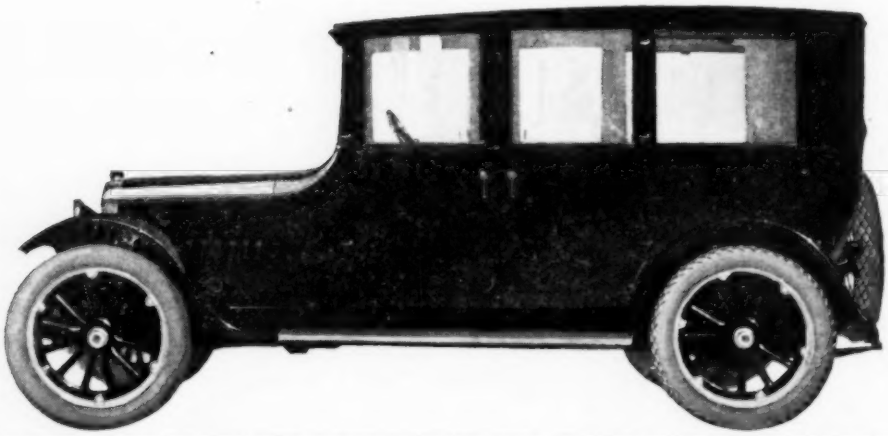
Name.....

Address.....

(Postal Money Order for $35.00 Enclosed)

Oakland

OAKLAND OWNERS REPORT RETURNS OF FROM 18 TO 25 MILES PER GALLON OF GASOLINE AND FROM 8,000 TO 12,000 MILES ON TIRES



THIS NEW OAKLAND SENSIBLE SIX FOUR DOOR SEDAN IS POWERED WITH THE FAMOUS 44-HORSEPOWER, OVERHEAD-VALVE OAKLAND ENGINE

OAKLAND
SENSIBLE SIX

AN appreciable proportion of the Oakland Sensible Six four door Sedans now being sold are going to families to whom first-cost is not the paramount consideration in the purchase of an automobile. These people are buying Oaklands purely on the basis of what Oaklands can give them in service, and of what Oaklands represent in value as against the moderate investment they entail. They find in the new Oakland Sensible Six four door Sedan a degree of constant usefulness that no other type of car can equal, and a measure of chassis reliability that even the most strenuous service cannot defeat. Every essential convenience, from mechanical lifts for the windows in its double-latch doors to an inconspicuous heater for use on cold days, has place in the equipment of this commodious and attractive car.

TOURING CAR, $1075; ROADSTER, $1075; COUPE, $1825; FOUR DOOR SEDAN, $1825
F. O. B. PONTIAC, MICH. ADDITIONAL FOR WIRE WHEEL EQUIPMENT, $75

OAKLAND MOTOR CAR COMPANY
Pontiac, Michigan

Tycos Thermometers

ADVERTISING
ARMORED
ART NOVELTY
ASPHALT TESTING
AUTO-CIRCULATION
BABIES' FOOD
BAKERS
BAKE OVEN
BANK
BATH
BOTTLE TESTING
BRINE PIPE
BROODER
BUTTER
CANDY MAKING
CELLULOID
CHANDELIER
CHEMICAL
CHURN
COAL OIL
COLD STORAGE
COLD TEST
COPPER CASED
DAIRY
DENTAL
DESK
DEVELOPING BATH
DIAL
DOUGH TESTING
DRY KILN
ELECTRIC
ELECTRIC ALARM
ENGRAVED SYSTEM
FAT TESTING
FEVER
FROST ALARM
FRUIT CAR
FRUIT EVAPORATING
GAS WORKS
GLASS WINDOW
GREENHOUSE
HOME CANDY MAKING
HOT BED
HOT WATER HEATING
HOUSEHOLD
HYDROMETER CAN
LABORATORY
LITHOGRAPHED TIN SCALE
MAPLE SUGAR
MARINE
MAXIMUM AND MINIMUM

FROM the kitchen range to the steel rolling mill—in every industry, in practically every phase and activity of life, temperature and temperature control is a mighty factor.

Everything you eat, wear or use is effected by temperature. Without temperature indicating, recording and controlling devices there could be no food preserving industry, no refrigeration, no steel industry, no rubber manufacture—none of a myriad industries. And physicians and surgeons would be at loss for accurate aids in safeguarding human life.

There are over 8,000 different kinds of temperature and pressure indicating, recording and controlling instruments in the Tycos line—over 8,000 silent servants of humanity. And in practically every industry and in every land Tycos instruments are known and used because of their dependable accuracy.

In the panels we list a few Tycos instruments. Ask your dealer about any instrument or type of instruments in which you are interested. If he won't supply you write direct to us for information and prices.

MEAT PACKERS'
MILK PASTEURIZING
MILK STERILIZING
ORCHARD
OVEN
PACKING HOUSE
PASTEURIZER
PHOTOGRAPHERS'
PIPE
PLATE GLASS
POCKET
PORCELAIN
PRECISION
RADIAL SCALE
RAILWAY
RECORDING
REFRIGERATION
REGISTERING
SEA WATER
SHIP HOLD
SHOWER BATH
SICK ROOM
STERILIZING
SUGAR FACTORY
SUGAR HOUSE
TITER TEST
TOBACCO CURING
TONING BATH
TRACK LAYING
VETERINARY
VULCANIZING
WEATHER BUREAU
WINDOW

Other Tycos Instruments

AVIATION ANEROIDS
BAROMETERS
CALCIOMETERS
CHARGOMETERS
CLINOMETERS
COMPASSES
CREAM GAUGES
FREEZOMETERS
HYDROMETERS
HYGROMETERS
HYGRO AUTOMETERS
PSYCHROMETERS
RAIL GAUGES
RECORDING BARO-THERMOGRAPH
SACCHAROMETERS
SALINOMETERS
SPHYGMOMANOMETERS
SPRAYOMETERS
STORMOGRAPHS
THERMOGRAPHS
TRANSITS

Taylor Instrument Companies

ROCHESTER, N.Y.

There's a *Tycos* and *Taylor* Thermometer for every purpose

REMINDO

You'll switch off the light— REMINDO *won't let you forget*

THE moment you turn on the cellar light or the garret light—any light with which Remindo is connected—you hear a gentle, pleasant buzz right at the switch.

And Remindo keeps buzzing gently till the light is switched off again.

Remindo reduces light bills—for it saves current often wasted for hours at a time—when you forget to switch off a light.

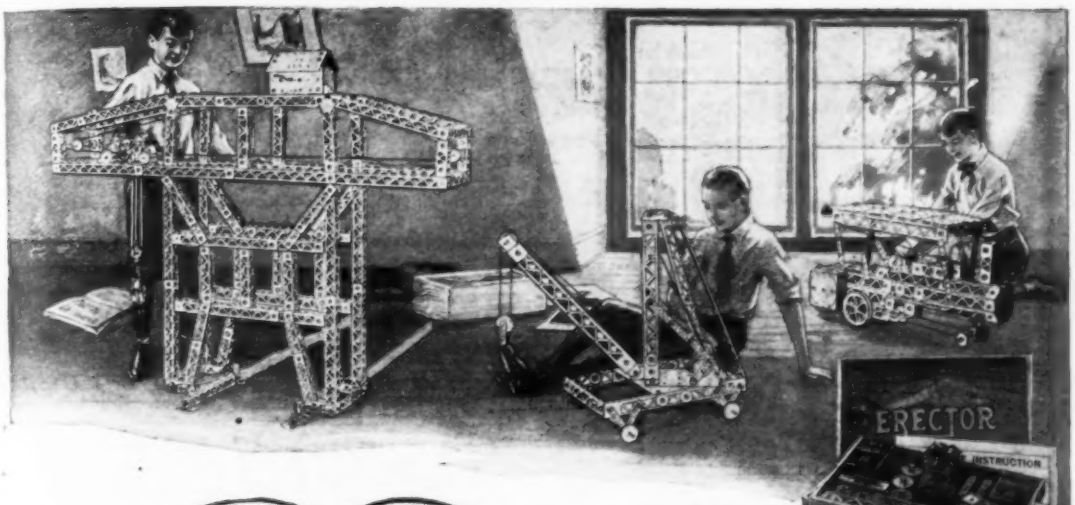
Remindo costs very little. The current it saves pays for it quickly.

Your electrical dealer will gladly show you Remindo. It's in the blue-and-orange convenience carton that identifies all the new G-E Electric Conveniences.

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y.

G-E electric conveniences

GENERAL ELECTRIC COMPANY



Construction Sets, Magic Electrical and Chemical Outfits

Do you want to build exact models of bridges, skyscrapers, machinery? You can build them true to life with Erector, the famous construction toy with girders like real structural steel. Most sets have a powerful little electric motor to operate the machinery models you build.

Gilbert Electrical sets, chemistry outfits, wireless sets, telephone sets, soldering and toy making outfits are not children's toys but real scientific outfits. To encourage original work with such outfits, I started the Gilbert Engineering Institute for Boys which awards degrees, diplomas, gold lapel buttons and gold watches as free prizes. Write for facts about it.

Big Prize Contest—I have started a big free toy building contest, with a real buckboard automobile or Shetland pony as first prize and a hundred other prizes. I'll send you details of the contest, copy of my boys' magazine and my catalog—all free. Write me today.

A. C. GILBERT, President

THE A. C. GILBERT COMPANY

104 Blatchley Ave., NEW HAVEN, CONN.

In Canada: The A. C. Gilbert-Menzies, Limited, Toronto
In England: The A. C. Gilbert Co., 17 Sherborne Lane, London, E. C. 4

GILBERT TOYS

Gilbert Erector

With Erector—the toy of square girders like real structural steel—you can build the finest models of bridges, sky-scrapers, elevators that run, and hundreds of other things, just as real workmen build them. Prices of sets $1.50 to $25. (In Canada $2.25 to $37.50.)

Gilbert Electrical Set

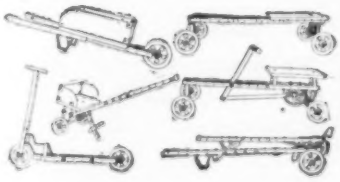
With a Gilbert Electrical Set and fine book on electricity, boys can do electroplating, install electric bells, electric lights, make a real electric motor and perform many feats of electrical magic. Sets from $2.50 to $10.00. (In Canada $3.75 to $15.00.)

Gilbert Mysto Magic

It's great fun to do magic tricks that keep even the grown-ups guessing. Gilbert magic sets contain some of the best tricks of real magicians. A big book on Magic and fine stage talk in each set so that you can give real shows and earn money. Sets from $1.50 to $10.00. (In Canada $2.25 to $15.00.)

Gilbert Outdoor Wheel Toy

Makes wagons, coasters, gliders, racers, trucks, etc. Fine steel disc wheels. The Crackerjack $10 set ($15 in Canada) has gears, pinions and extra parts to make a real power speedster. Then there is a fine $6 set ($9 in Canada) and a big $15 set ($22.50 in Canada.)



MAIL THIS COUPON

The A. C. Gilbert Co., 104 Blatchley Ave., NEW HAVEN, CONN.

Please send full details of your big toy building contest for boys and also, free copy of your boys' magazine and your toy catalog.

Name .....

Address .....

City .....

State .....

Age .....

"Made in America" "American Flyer"
"The Train with the Guarantee" MINIATURE RAILROADS
Registered U.S. Patent Office

The Electric Train That Is More Than a Toy

The "American Flyer" Electric Train is a practical introduction to the great field of electricity. It gives actual experience with electrical apparatus. It is more than fun — it is educational and intensely interesting.

Transformers

"American Flyer" Electric Trains will run on batteries, but "American Flyer" Transformers are more economical and give better results. With a Transformer you can use the house current. "American Flyer" Transformers are especially built for "American Flyer" Trains. Longer life and greater satisfaction are secured by using the Transformer that is made for these trains. Price $4.50.

Exclusive features distinguish these electric trains. Thanks to perfect construction and adjustment, motor efficiency gives maximum power on minimum current. Low current means less strain, no heating, longer life for motor. Longer life for batteries, too, if batteries are used. Cars and engines are just like real. Ask for an "American Flyer" Electric outfit for Christmas.

"American Flyer" Mechanical Trains

Look for this Sign

Look for this Sign. It marks an "American Flyer" dealer. Wherever you see the boy operating the "American Flyer" train you may know you can get the best railroad outfit made, in that store.

Engines and cars are just like the latest type trains. Lever control and brakes on engines—just like real—are exclusive "American Flyer" features. The "American Flyer" Patented Steel Gear Motor makes these engines go faster with heavy loads.

Send for Interesting Catalog

Complete railroad outfits are shown in this fascinating book. Everything the railroad man uses. Join the 2,000,000 happy boys who already own "American Flyers."

Ask Your Dealer

to show you an "American Flyer" System. If he can't, write us direct. Set your heart on an "American Flyer" this Christmas and be sure you get it.

AMERICAN FLYER MFG. CO.
2235 S. Halsted St. CHICAGO, ILL.
Makers of a complete line of Electrical and Mechanical trains

MECCANO

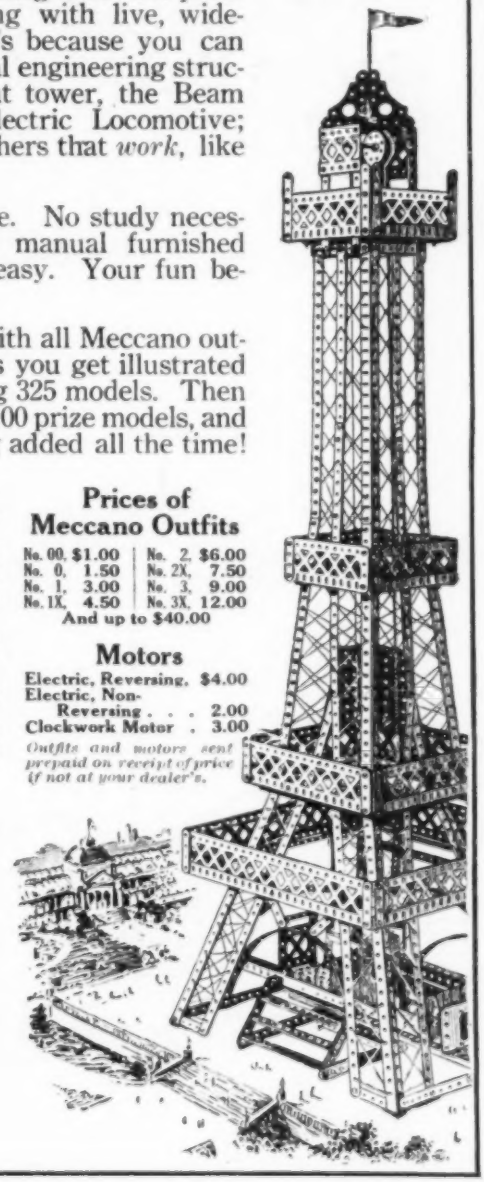
Toy Engineering For Boys

XMAS, with its gift-giving fun, is nearly here. Have you and Dad decided on your Meccano outfit? You should. For all-around fun, every day in the year, nothing takes the place of Meccano building with live, wide-awake boys. That's because you can build wonderful, real engineering structures like this great tower, the Beam Engine and the Electric Locomotive; also hundreds of others that *work*, like regular machinery.

Each outfit complete. No study necessary. Big, illustrated manual furnished makes it all clear and easy. Your fun begins at once.

425 Dandy Models! With all Meccano outfits from No. 1 upwards you get illustrated instructions for building 325 models. Then comes Book No. 2 with 100 prize models, and something new is being added all the time!

YOU Can Build This Eiffel Tower



Send for This BIG $4.50

Xmas Set

Postpaid if not at your dealer's

With It You Can Build:

Railroad Cars
Sleighs
Swings
Windmills
Cable Railways
Jib Cranes
Monoplanes
Bridges
Drilling Machines
Potter's Wheels
Torpedo Boats
Merry-go-rounds
Ore Crushers
Lathes
Beam Scales
Machine Guns
Drill Presses
and scores of others

SUPERB FREE BOOK

Complete story of Meccano, told by the inventor himself in a book called "The Wonder Book." Contains many pictures of models and boys building them—also hours of interesting reading. This absorbing book will be sent you free. Let us have your name and address now, so you will receive it before Xmas.

MECCANO CO., Inc.
Division H
71 West 23d Street,
NEW YORK, N. Y.

Prices of Meccano Outfits

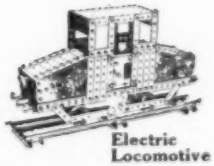
No. 00,	$1.00	No. 2,	$6.00
No. 0,	1.50	No. 2X,	7.50
No. 1,	3.00	No. 3,	9.00
No. 1X,	4.50	No. 3X,	12.00

And up to $40.00

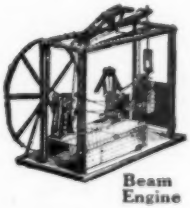
Motors

Electric, Reversing,	$4.00
Electric, Non-Reversing . . .	2.00
Clockwork Motor .	3.00

Outfits and motors sent prepaid on receipt of price if not at your dealer's.



Electric Locomotive

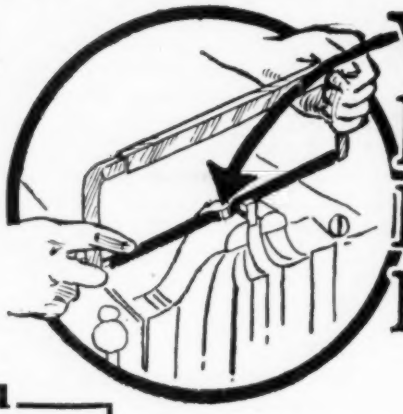


Beam Engine

ATKINS

AAA NON-BREAKABLE HACK SAW BLADES

One of These Books Is of Value To You



Why This Hack Saw Blade Does Not Break!

These books describing Atkins Products are full of useful suggestions of value to every man. At least one of them has a big, valuable story for you. We will send you any of them without charge. Just check the one you want and write your name and address on the margin of this page. Mail it today!

"Atkins Metal Saws"
"Metal Cutting Machines"
"Hack Saw Blades"
"Atkins Hack Saw Chart"
"Atkins Cross Cut Saws"
"Silver Steel Drag Saws"
"Atkins Mill Saws"
"Atkins Braces"
"Atkins Machine Knives"
"Atkins Plastering Trowels"
"The Story of Silver Steel"
"Saw Sense"
"The Saw on the Farm"
"The Manual Training Book"
"Saws in the Filing Room"

IF you ever cut metal with a hack saw—it will pay you to know about Atkins AAA Non-Breakable Hack Saw Blades.

They make metal cutting faster and easier—do away with lost time and material and broken blades.

Like "Silver Steel" and many other great improvements in saw making—the Non-Breakable Hack Saw Blade is an Atkins discovery.

The body of the blade is of tough, selected steel. You can turn and twist it without breakage in work. The cutting edge is gas-and-oil tempered to give quick, easy cutting.

The Atkins Hack Saw Chart (sent free) tells the right blade for every metal cutting use and lists the full line of Atkins AAA, Non-Breakable and Power Hack Saw Blades.

Try This Blade—Now!

If you send us your name and address and 10c in stamps we will send you an 8 or 10 inch Atkins AAA Non-Breakable Hack Saw Blade. Try it on your regular work. We'll return your money, if it isn't the best blade you ever used. Write for your saw today!

E. C. Atkins & Co., Inc., (Est. 1857) Indianapolis, U. S. A.

Makers of Silver Steel Saws and Tools; Automobile Clutch Discs; Meat Slicer, Belt Splitting, Cigarette and Tobacco Knives; Cabinet Scrapers and Specialties.

Canadian Factory: Hamilton, Ont.; Machine Knife Factory: Lancaster, N. Y. Branches in New York, Chicago, Memphis, New Orleans, Atlanta, Minneapolis, Seattle, San Francisco, Portland, Ore., Vancouver, B. C., Paris, and Sydney, N. S. W.

ATKINS ALWAYS AHEAD · AAA · E. C. ATKINS & CO. INDIANAPOLIS

Wurlitzer Cornet Outfit

Reg. U.S. *Pat. Off.*

WURLITZER

200 YEARS OF MUSICAL INSTRUMENT MAKING

Complete Musical Outfits

Sent on Trial

Wurlitzer Saxophone Outfit

A NEW plan. Wurlitzer, the largest general music house in the world, is offering the finest musical instruments with complete outfits at factory price. With each instrument comes a handsome carrying case; all attachments and extra parts; music rack; instruction book and book of musical selections. Everything you need at a tremendous saving. Total cost practically that of the instrument alone.

Convenient Monthly Payments

Any Wurlitzer Complete Musical Outfit will be sent you for a full week's free trial in your own home. You are under no obligations to buy. If you decide to keep it you may pay the direct-from-manufacturer price in small monthly sums. A few cents a day will make one of these beautiful instruments and outfits your own.

These Complete Outfits are ready. Send for one on free trial.

Violin	Trap Drum	Bugle	Tenor Banjo	Banjo-Guitar
Cornet	Clarionet	Fife	Banjo-Mandolin	Ukelele
Saxophone	Piccolo	Guitar	Banjo-Ukelele	Hawaiian Guitar
Trombone	Flute	Mandolin	Banjo	Viola
Mellophone				Cello

Wurlitzer Violin Outfit

Send the Coupon *For Splendid New Catalog*

The instrument of your choice and everything in the complete outfit fully illustrated and described, with full details of the free trial and easy payment plan. We are manufacturers of all musical instruments. This wonderful catalog is a veritable musical encyclopedia. We will send it to you free and without obligation. Mention the musical instrument in which you are interested. Mail the coupon now.

The Rudolph Wurlitzer Co., Dept. 1199
117 E. 4th St., Cincinnati—329 S. Wabash Ave., Chicago

Send me your new catalog with illustrations in color and full description of the Wurlitzer Complete Outfits and details of the free trial and easy payment offer.

Name.....

Address.....

.....

(Musical instrument I am specially interested in)

WALTHAM THE SCIENTIFICALLY BUILT WATCH

AND THE FOREIGN BUILT WATCH

The Master Assembler

Know Something About the "Works" in the Watch You Buy

THERE are limitations to human handiwork in watchmaking which American genius has circumvented by the miracles of machinery — miracles which, for exactitude, precision and finish — transcend the skill of the human hand.

We have told you that Waltham machinery creates a standard of accuracy unapproached elsewhere in the world. That the "parts" of Waltham movements are distinctive in material, design and advanced process of manufacture. And when these "parts" come to the Waltham Master Assembler, they meet the eye, the skill, the knowledge of a master craftsman thoroughly conversant with the formulas exclusively invented and developed by Waltham genius in watchmaking.

He is the assembler of the Balance and Hairspring (the heart and brain of the watch) which ultimately beats upon your wrist or in your pocket 432,000 pulsations a day, year in and year out. A transferring of energy into motion that is truly wonderful when we seriously think of it.

The Assembler of the foreign-built watch, known as a "repasseur," is to be pitied. He knows no defined standard of quality. The material that comes for his inspection is of unknown quantity in accuracy of construction and finish. His capacity is rather that of a judge. He must decide on the barest information and appearance whether one part is good enough to equal or stabilize another. This condition exists because the foreign-built watch is an assembled watch — the parts made in many shops and homes, with *hand* machines; no standardization, no ideal, and every buyer of a foreign-built watch incurs this liability.

The Waltham Master Assembler is unique. He is a product of Waltham supremacy in watchmaking. He is the human distinction hidden in this world-famed watch — a unit in its performance which has placed it in actual competition above the world's finest watches. He is a living symbol of Waltham, guarding day by day an international reputation, at once a guarantee to you that your purchase of a Waltham Watch is a lifelong investment.

This story is continued in a beautiful booklet in which you will find a liberal watch education. Sent free upon request. Waltham Watch Company, Waltham, Mass.

Waltham 7½ Ligne

The movement is actually smaller than a dime in diameter

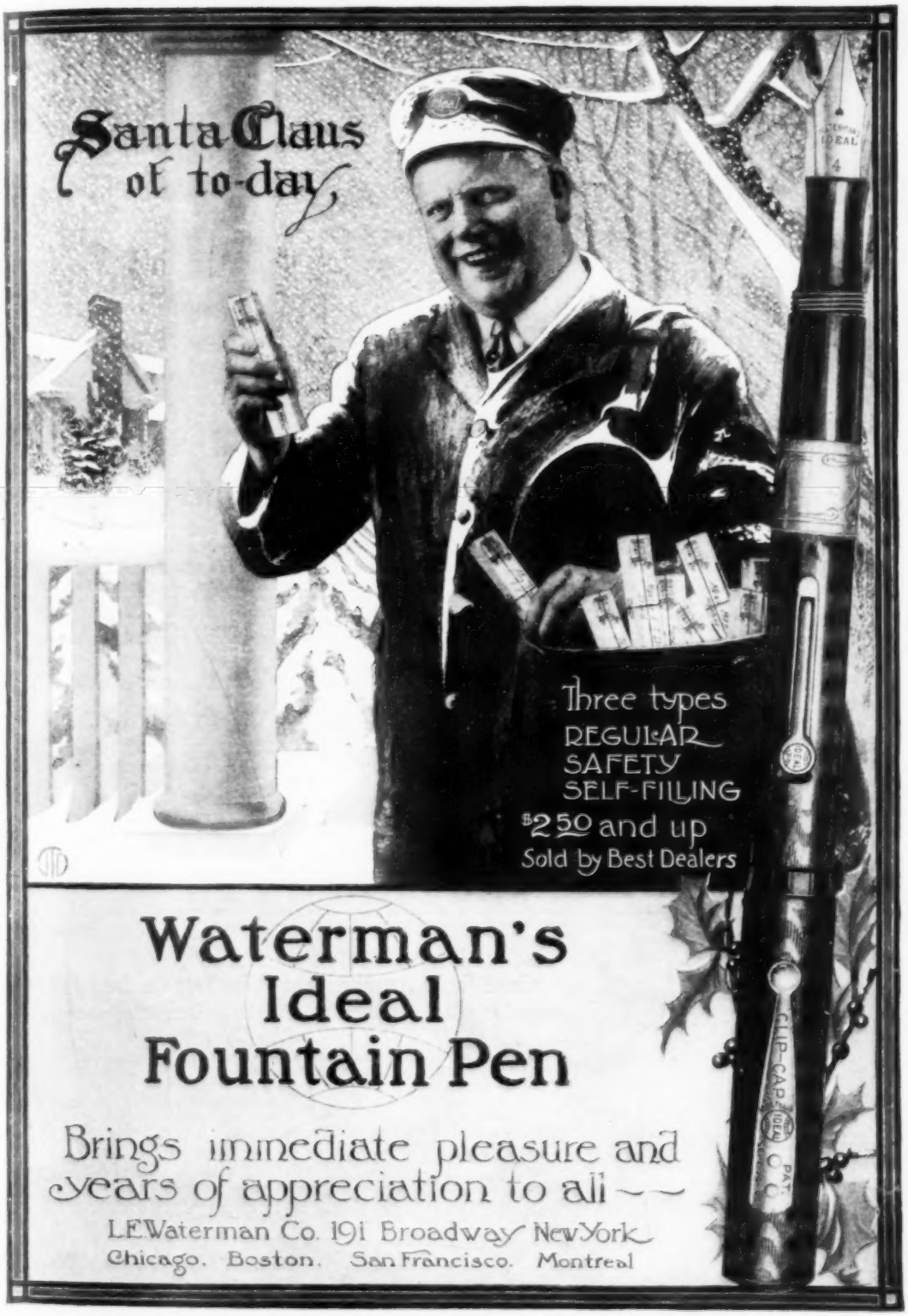
$175 to $1,000 or more

depending upon the case

WALTHAM

THE WORLD'S WATCH OVER TIME

Please Mention Popular Mechanics


Santa Claus of to-day
Three types
REGULAR
SAFETY
SELF-FILLING
$2.50 and up
Sold by Best Dealers
Waterman's Ideal Fountain Pen
Brings immediate pleasure and years of appreciation to all
L.E.Waterman Co. 191 Broadway New York
Chicago. Boston. San Francisco. Montreal

Plans for Model Aeroplanes

Scale Drawings, with full Building and Flying Instructions for the following Ideal Model Aeroplanes, sent upon receipt of price:

NC-4 (Naval-Curtiss Seaplane)...**50c**
DeHAVILLAND Battle Plane, 35c
Bleriot Monoplane, Curtiss Military Tractor, Nieuport Monoplane, Taube Monoplane, Cecil Peoli Racer—35c Each.

Get an Ideal Model Aeroplane for Christmas!

Building and Flying Ideal Model Aeroplanes is the finest fun you ever had because Ideal Models are perfect duplicates of well-known aeroplanes. They look exactly like real aeroplanes, and have parts and fittings just like actual machines. Build one and learn how aeroplanes are constructed, operated and controlled. You'll have fun building it and then you can make flights; Ideal Model Aeroplanes are guaranteed to rise from the ground or water by their own power and fly in the air.

Build and Fly Models of Real Aeroplanes

Ideal Model Aeroplane Construction Outfits make building easy. They contain all parts, fittings and materials, with Plans and full Building and Flying Instructions—you can't go wrong. You make the parts and assemble them just like a real Aeroplane mechanic. You can get Outfits to build any of these famous Aeroplanes from Ideal Dealers in your city or state, or direct from us where we have no dealer:

N C - 4 (Naval-Curtiss Seaplane). First to cross the Atlantic Ocean. 4½ ft. Model. See picture No. 1. Complete Construction Outfit.....**$10.00**

DeHAVILLAND Battle Plane (DeH-4). The 'plane used by the American Aces in France. 3 ft. Model. Pictured above. Complete Construction Outfit.....**$8.50**

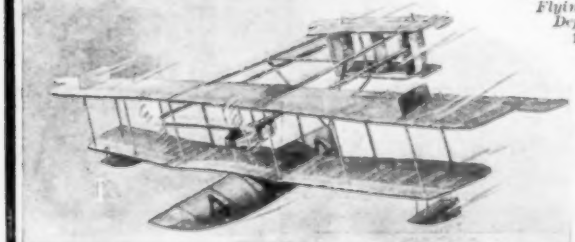
Bleriot Monoplane. The Famous Cross-Channel Model. 3 ft. size. See picture No. 2. Complete Construction Outfit. Price.....**$6.00**

Curtiss Military Tractor. The 'plane used for training pilots. 3 ft. Model. See picture No. 3. Complete Construction Outfit.....**$7.50**

Nieuport Monoplane. The French Scout 'Plane. 3 ft. Model. See picture No. 4. Complete Construction Outfit.....**$7.00**

Cecil Peoli Racer. A Racing-type, record making flyer. Complete Construction Outfit. Price.....**$4.50**

West of Denver, Colo., Prices are a Little Higher.



Ideal Racing Aeroplanes and Flying Toys Are Great Fun

Ideal Racing Aeroplanes (Not Models of Real Aeroplanes) are record breakers; they fly far and fast; with, against or across the wind. Ideal Flying Toys, too, are fine fun-makers for all boys. Different styles to pick from, all well made and reasonably priced. Some sold in knock-down form ready to put together; others complete ready to fly.

Ideal Model Aeroplanes, Ideal Racing Aeroplanes and Ideal Flying Toys are sold by Leading Toy, Sporting Goods and Department Stores. Ask for them at your store. Be SURE you get IDEAL Model Aeroplanes because they are the best and the only ones that are actual copies of the real, famous aeroplanes.

Ideal Aeroplane Catalogue—10c

Send for this Catalogue of Model Aeroplanes, Parts and Supplies and find out more about these wonderful Models of real aeroplanes. Catalogue sent postpaid for 10 cents, stamps or coin. Gives list of all Ideal Dealers.

Ideal Aeroplane & Supply Co.
Making Model Aeroplanes Since 1911
159 Wooster Street NEW YORK
Cor. West Houston Street

Transportation—*The New Sport for Real Boys*

If you only had a railroad of your own, or a fleet of power boats, what sport you would have! Just think of the fun being president, superintendent, dispatcher, engineer and conductor on your own train or captain, mate, purser, helmsman, and engineer of your own boats.

Ives Toys make this all possible. There are fine, big Ives Trains that run by electricity. Start the powerful electric locomotive by a switch; control its speed. Stop the train and reverse it at your will. With Ives stations, switches, sidings, semaphores, culverts, tunnels, bridges and other parts you can have a complete railroad system, as elaborate as you wish. Then there are Ives Trains that are pulled by mechanical locomotives with strong motors that run a long time on one winding. Ives builds passenger and freight cars, baggage cars, coal cars—all kinds of rolling stock. And they are built to last, just like regular cars.

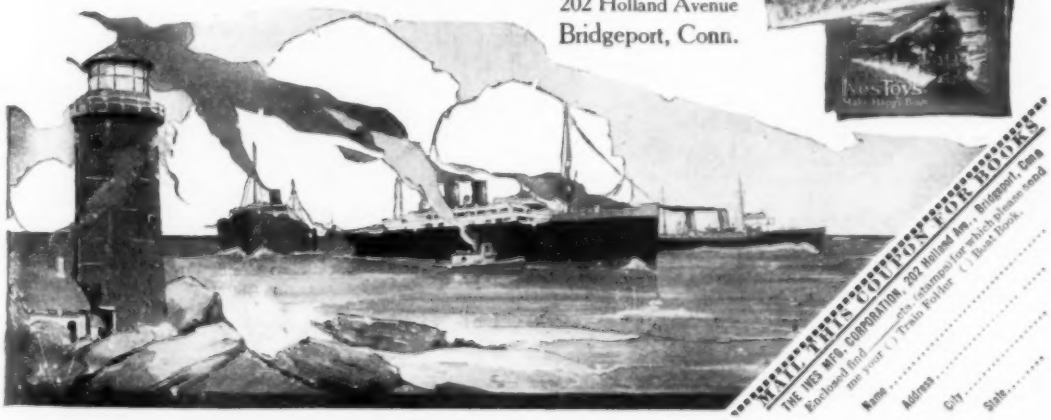
IVES TOYS

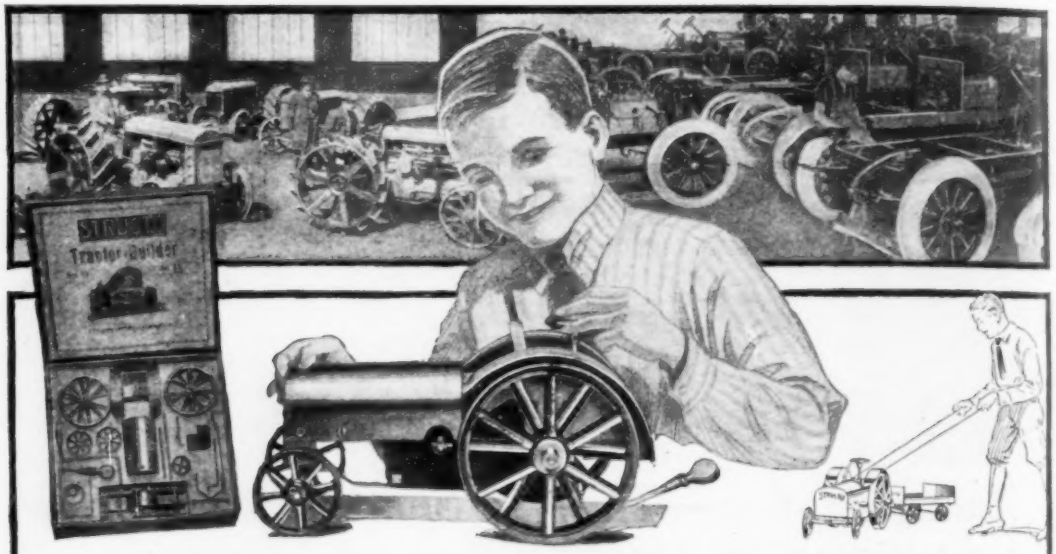
Ives Toys
Make Happy Boys

Ives Boats are the newest and finest toys out. Made of steel and driven by screw propeller and strong, long-running motor. Steered by a regular rudder, Ives Boats speed along at a great rate for long distances on a single winding. There are twelve models and sizes, among them being an ocean liner, U. S. Merchant Marine, patrol boat, launch, motor boat, freighter and others.

Good toy stores and toy departments everywhere sell genuine Ives Toys. Be sure that the name "Ives" is on the train or boat you buy. For 4c in stamps we will send you either our booklet on boats or our folder on trains; both for 6c. The boat book contains rules of the sea, signals, dictionary of nautical terms and other navigation information.

THE IVES MFG. CORPORATION
202 Holland Avenue
Bridgeport, Conn.





Build Models Like Real Automobiles!

Structo Tractors, Trucks and Automobiles are built like real machines. They *are* real machines—made for boys to build—have parts like real cars. You build your own Automobile, Tractor or Truck—learn the principles of automobile construction, and have a lot of real sport while you're doing it.

Structo Models have lots of speed and pulling power. Strong, powerful motors send them over the road in record time; straight ahead or around in a circle, up-grade or on the level. They have many features of real cars.

STRUCTO TOYS

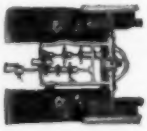
MAKE MEN OF BOYS

Look at these dandy Models; all the newest type machines that are copies of big ones. Pick the one you want now and head your Christmas list with a Structo Auto Builder Outfit. Tell all the folks to be *sure* and get you one.

Structo Bear Cat Auto

Model No. 10

16 in. long. Red body. Single-unit motor; shaft drive. Price **$6.50**



Made Like a Real Automobile

See the sliding gears and the regular differential. Throw in the gears and she's off! High or low speed and reverse.

Model in picture above is Structo Farm Tractor; Model No. 11. Price..... **$7.50**

West of Denver, Colo., and in Canada, Prices are a little higher.

Structo De Luxe Auto

Model No. 12

16 in. long. Orange body. Triple-unit motor; sliding gear transmission and differential. **$10.00**

Structo Racing Auto

Model No. 8

Green body. Single-unit motor; shaft drive. Price..... **$5.00**

Structo Dump Truck

Model No. 14

Red body. Triple-unit motor; sliding gear transmission. Load dumping attachment. Price **$12.00**

Ask to see Structo Auto Builder Outfits in the Toy Department, at the Hardware Store, or at any store that sells good toys. Ask for them by name. Get one and you'll have loads of fine fun.

STRUCTO MANUFACTURING CO., Freeport, Ill., U. S. A.

Buy American-Made Toys

SANTA CLAUS—the good American that he is, this year has turned to Uncle Sam for his toys. In fact the pair of them have been working together for months and months for our American kiddies.

They have planned and arranged and built really wonderful things. They are original—there is a host of new toy ideas.

They are conceived and built by American men and women — they are not the thoughts or work of foreign countries.

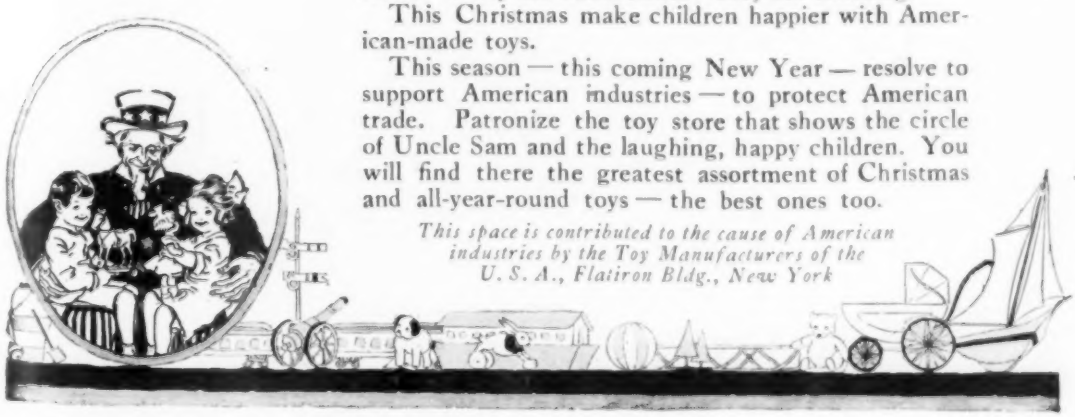
Patronize the toy store that displays this sign

American-made toys are best for the children because each toy is perfect. The design is right, the craftsmanship is careful—there are more to pick and choose from. They are educational—they are amusing.

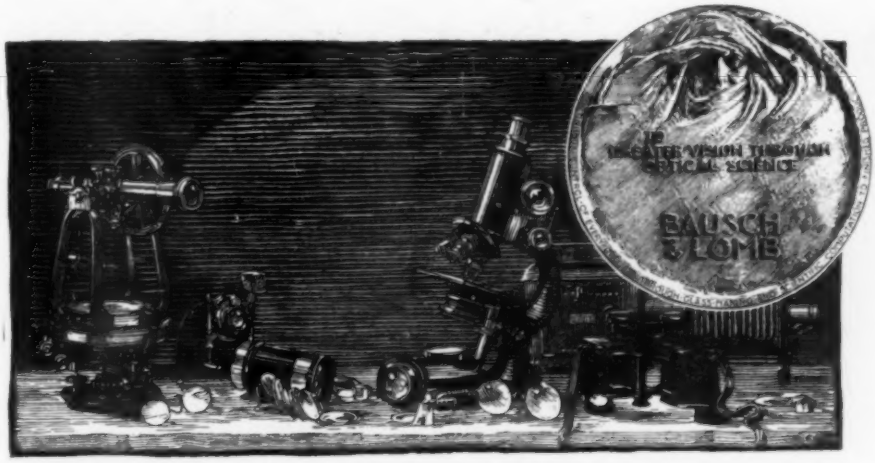
This Christmas make children happier with American-made toys.

This season — this coming New Year — resolve to support American industries — to protect American trade. Patronize the toy store that shows the circle of Uncle Sam and the laughing, happy children. You will find there the greatest assortment of Christmas and all-year-round toys — the best ones too.

This space is contributed to the cause of American industries by the Toy Manufacturers of the U. S. A., Flatiron Bldg., New York



HAMMER THE HAMMER
The Trade-Mark that Reflects the Truth
The Iver-Johnson is known the world over as the revolver that can't go off by accident. Drop it, throw it, or "Hammer the Hammer"—it is the *safe* revolver.
IVER JOHNSON
SAFETY—AUTOMATIC REVOLVERS
The Iver Johnson is alive, alert, ready. Drawn tempered piano-wire springs assure permanent readiness for use. And the perfect rifled barrel speeds the bullet straight as a streak of light just where you aim.
Choice of three grips: Regular, Perfect Rubber, Western Walnut.
Three Booklets Free
All worth reading "A"—Firearms; "B"—Bicycles; "C"—Motorcycles. Yours free merely for the asking.
If your dealer cannot supply the Iver Johnson, send us his name and address. We will supply you through him.
IVER JOHNSON'S ARMS & CYCLE WORKS
307 River Street, Fitchburg, Mass.
99 Chambers St., New York 717 Market St., San Francisco
Iver Johnson Superior Roadster. Price $50. Other models $27.50 to $60



A piece of glass . . . just a bit of sand and of salt . . . exactly combined, carefully melted, skilfully formed and polished — a LENS! —and windows open upon other worlds, too tiny or too far away for naked eyes to see. Marvelous instruments come to the aid of industry, or play their vital part in war, on land or sea or in the air; old eyes grow young, and weak eyes strong—all through these wonderful bits of glass called lenses, perfected by science that men may see better and farther.

¶ The microscope, revealing all around us the swarming life of organisms too small to measure—

¶ The telescope lens, through which dim, distant stars draw near, and man explores the age-old mysteries of celestial cycles—

¶ The unerring camera lens, through which our modern world writes history in pictures—

¶ The projection lens, which translates still or moving pictures from slide or film to screen—

¶ Great searchlight mirrors, range-finders, gun-sights, binoculars, periscopes — the eyes of our fleet and our army.

¶ Ophthalmic (eyeglass) lenses, which correct eyesight, and add to life's richness and comfort—

¶ Precise and delicate instruments, for exact scientific research in many fields.

These suggest, but fall far short of measuring the countless services rendered daily to humanity by the world's largest manufacturers of lenses and optical instruments.

Write for literature on any optical product in which you are interested.

BAUSCH & LOMB OPTICAL COMPANY

Makers of Eyeglass and Spectacle Lenses, Photographic Lenses, Microscopes, Balopticons, Binoculars, and Engineering and other Optical Instruments.

Rochester, New York

New York Chicago San Francisco Washington London

Christmas Suggestions

BUY YOUR CHRISTMAS GIFTS TODAY

Select your Diamond and Jewelry gifts from our 126-page Catalog Number 3G. Send your order for prompt shipment. Your credit is good. We trust you for all the goods you want on the

Lyon Charge-Account-Plan

You pay nothing in advance—not one cent. Shipments are made at our expense and risk. You examine first and only after satisfied you send 20% as first payment. Then send only 10% monthly—at the rate of a few cents a day. You get full protection under our

8% Yearly Dividend Offer

Every "Lyon" Diamond is backed by our ***binding guarantee,*** covering the quality and value. MORE than that. On the exchange of any "Lyon" Diamond for a larger one, you get 8% YEARLY INCREASE IN VALUE—8% per annum MORE than what you paid.

Our 75 Years' Reputation

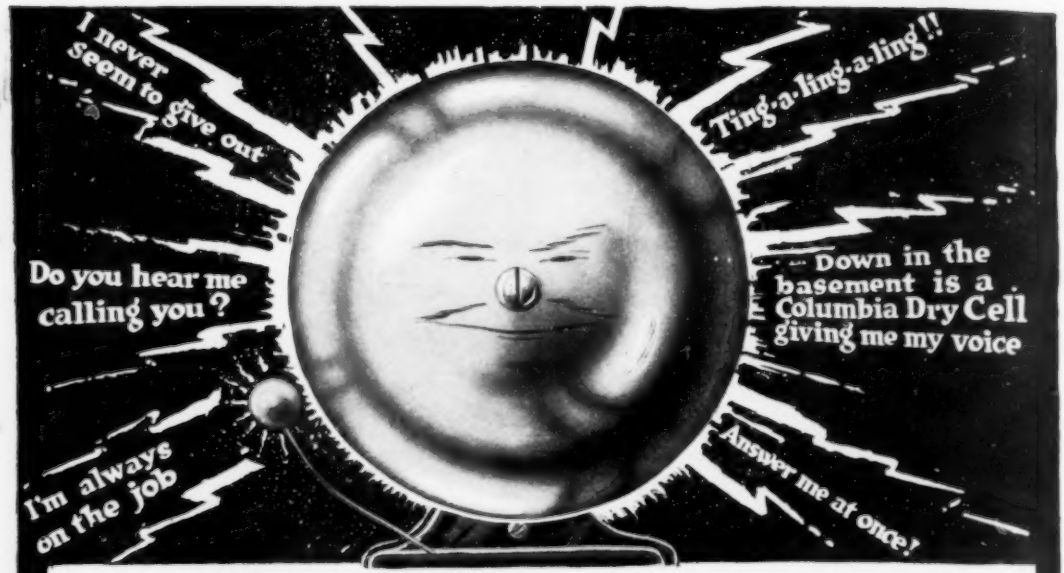
guarantees you honest goods at lowest prices. If our Diamonds don't represent SUPERIOR VALUE, return at our expense. No obligation, annoyance, or red-tape. You don't pay a cent until you are pleased beyond your expectations. Send to Dept. 3G for our 126-page Christmas Bargain Catalog. Investigate our REMARKABLE OFFER. Let us explain how you can earn an EXTRA BONUS.

Special cash discount of 15% for this month only

J. M. Lyon & Company, 1 Maiden Lane, New York

KODAK — the gift that helps to make her Christmas merry — then keeps a picture story of the Christmas merriment.

EASTMAN KODAK CO., ROCHESTER, N. Y., *The Kodak City*



You can Bet there's a Columbia Dry Battery back of this bell —

IT'S a sassy ring—an insistent ring—a ring that never fails. It's the lusty, vigorous ring that millions of Columbia Dry Batteries are pounding out in millions of homes day after day, year after year.

But these peppery little Columbias do more than make the lustier tone—they last longer. Yet they cost no more.

When the doorbell, buzzer, or other electric necessity about the house begins to yawn and quit, a new Columbia or two will give a new lease of life. . . . Don't ask for just "a battery"—make the man understand you want Columbia.

The Columbia Dry Battery does 71 jobs—from harp playing to egg testing. The universal uses are

—to ring doorbells—to light flashlights
—to buzz dining room buzzers
—to regulate the heat in homes
—to run toys for kiddies
—to make telephones speak up
—to ignite the power in autos, motorboats, and farm engines.

For sale in every store where you would naturally inquire. Fahnestock Spring Clip Binding Posts, no extra charge.

NATIONAL CARBON COMPANY, Inc.
Cleveland, Ohio
Canadian National Carbon Co., Limited
Toronto, Ontario

THE STORAGE BATTERY

WHEN you buy a Storage Battery, look for the Pyramid Seal—it distinguishes Columbia from all others, and is the symbol of the famous Columbia Storage Battery guarantee of *definite power for a definite time.* . . . Any Columbia Service Dealer or Service Station will gladly explain to you the advantages that only Columbia Storage Batteries can give.

Columbia Dry and Storage Batteries

J-19

Mr. Smith had a horse—

Mr. Brown wanted to buy the horse, but he didn't know much about horses. Mr. Smith said if he didn't like the horse, he would give back Brown's money. But Mr. Brown figured that if the horse were right, Smith would let him try it out first, before he paid for it. So he didn't buy the horse, although he wanted it badly.

We are not like Mr. Smith and his horse. We'll let you prove to yourself *before you buy* it that the 1900 Cataract Electric Washer saves time, money, work, and clothes. The 1900 dealer in your town will deliver a Cataract Washer right to your home. After you have tried it out, you may start paying for it on terms to suit your convenience. And it will pay for itself in the money you can save.

Special Feature. It is the magic figure 8 movement that makes the 1900 Cataract the perfect washing machine. By means of this the water is forced through the clothes in a figure 8 movement—four times as often as in the ordinary washer.

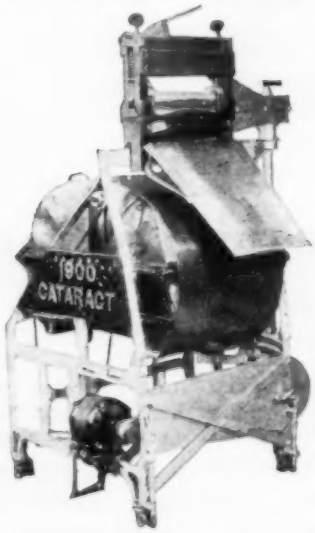
Fill out the coupon today. If you do not have electricity, write us about our other washers. We have them in many styles, and at all prices.

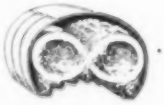
1900 CATARACT WASHER

1900 WASHER COMPANY, Binghamton, N. Y.
Canadian Factory and Office, 357 Yonge Street, Toronto

No parts in the tub, and no heavy cylinders to lift out.

The swinging reversible wringer works electrically.





The water swirls through the tub in a figure 8 movement, and four times as often.

Comes in 8 and 12 sheet sizes

1900 Washer Company
Binghamton, N. Y.

Please send me detailed information, and the name of the nearest 1900 dealer.

Name_____

Address_____

City and State_____

Champion

Dependable Priming Plugs

Equip Your Engine So It Sure-Fires When Cold

Champion Dependable Priming Plugs sure-fire cold motors because, with the priming cup right in the plug, the gasoline trickles down the core of the plug and drips from the sparking point where the spark jumps and is the hottest.

They are imperative in cold weather for the hundreds of thousands of cars that do not have priming cups, and are infinitely better for those that do, because priming cups let the gas in too far from the spark plug. Every car can be easily equipped with these plugs in a few minutes.

Get a set of Champion Dependable Priming Plugs from your dealer, and insure easy starting in cold weather. Price $1.50 each.

Champion Spark Plug Company, Toledo, Ohio

Champion Spark Plug Co. of Canada, Limited, Windsor, Ontario

Are You Using Tubing in Short Lengths?

As large manufacturers of light gauge steel tubing we accumulate great quantities of short lengths.

We offer this first class material at attractive prices.

SIZES

From ¼ in. to 3 in. Outside Diameter.
From 11 to 22 gauge.
Lengths 2 feet and under.

Facilities for forming to various shapes.

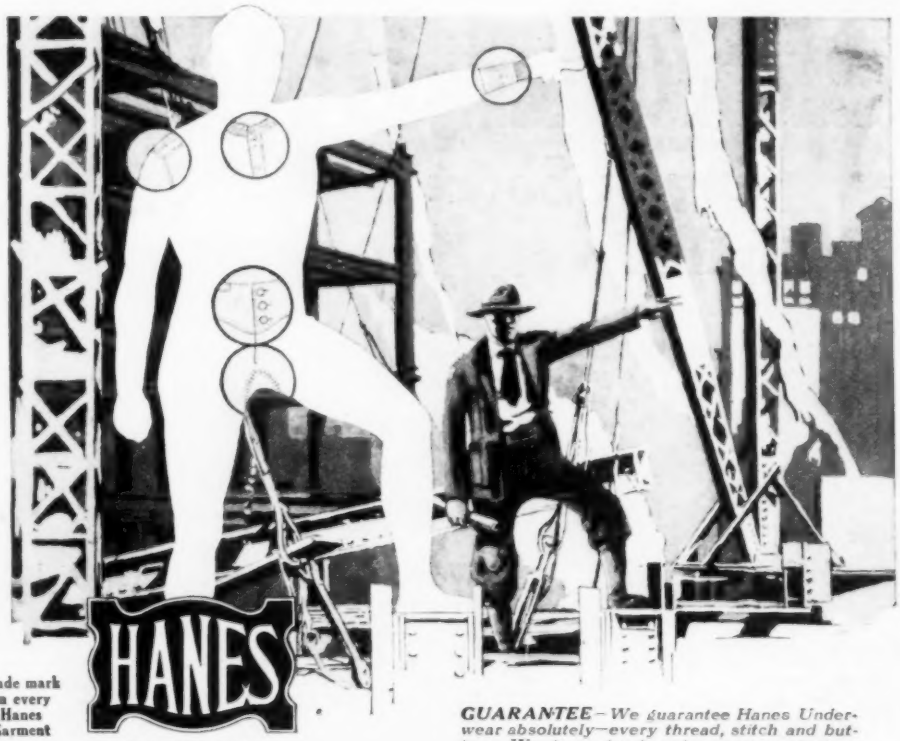
Send us your inquiries.

STANDARD WELDING DIVISION

THE STANDARD PARTS COMPANY

CLEVELAND, OHIO

Stan-Par PRODUCTS *Include Axles, Bearings, Springs, Rims, Tubing, Tubular Parts, Gear Rings, Rods and Rod Assemblies for the Automotive, Vehicle, and other Industries.*



Trade mark on every Hanes Garment

HANES

ELASTIC KNIT
UNDERWEAR

GUARANTEE—We guarantee Hanes Underwear absolutely—every thread, stitch and button. We guarantee to return your money or give you a new garment if any seam breaks.

Quality and care put into Hanes Underwear will astound any man!

YOU'D rate Hanes winter Men's Union Suits and Shirts and Drawers *sensational value* if you followed the bales of fine, long-staple cotton from the moment they entered the Hanes Plant until you saw Hanes Underwear packed into boxes for shipment all over the nation!

What goes into Hanes in quality and workmanship comes out to you in extra-wear, extra-comfort, extra-warmth! We tell you frankly that Hanes is the biggest underwear value ever sold at any price! *Prove our statement for your own satisfaction!*

Read every detail and compare with the circles in the diagram figure above, because you should understand what Hanes hands you: *Guaranteed* unbreakable seams, with reinforcements at buttonholes and at every strain point; elastic knit collarette that snugs up to the neck, preventing gaps; shape-holding elastic knit shoulders that "give and take"; durable, snug-fitting three-button sateen waistband; elastic knit wrists; pearl buttons sewed on to stay! Put behind that array of wear and comfort features Hanes perfect workmanship and *Hanes quality!*

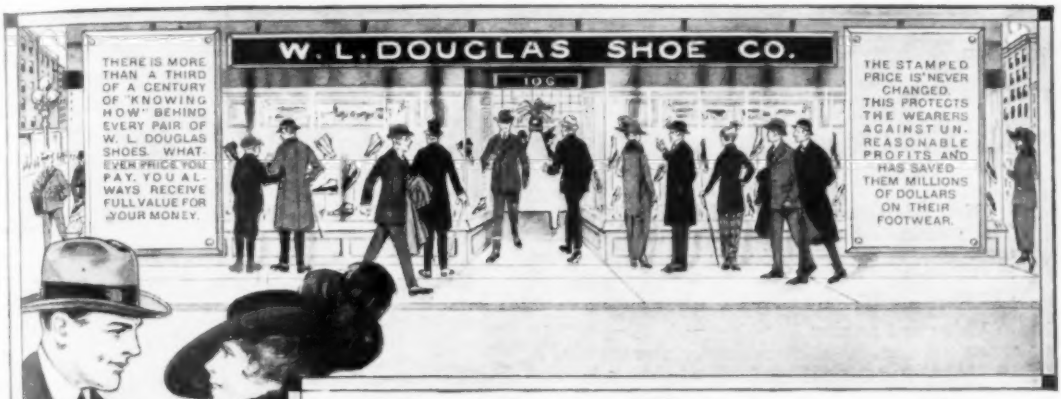
Hanes Union Suits have never been near-equaled at the price. They have all the desirable features of Hanes Shirts and Drawers *with a closed crotch that stays closed!*

"Hanes" Union Suits for Boys are as wonderful value as our men's garments. To mothers and fathers Hanes boys' Union Suits are superb. Cozy, fleecy warmth and the finest workmanship put these boys' suits in a class distinct from all others. *They certainly do stand the wear and wash!*

See this Hanes Underwear at your dealer's. If he cannot supply you, write us immediately. *Any Hanes garment will outlive our guarantee!*

P. H. HANES KNITTING CO., Winston-Salem, N. C. New York Office 366 Broadway

Warning to the Trade—Any garment offered as "Hanes" is a substitute unless it bears the Hanes label.



W. L. Douglas

"THE SHOE THAT HOLDS ITS SHAPE"

$5.00 $6.00 $7.00 $8.00 $9.00 & $10.00

You can save money by wearing W. L. Douglas shoes, the best known shoes in the world. Sold by 106 W. L. Douglas own stores and over 9000 shoe dealers. W. L. Douglas name and the retail price stamped on the bottom guarantees the best shoes in style, comfort and service that can be produced for the price.

The stamped price is W. L. Douglas personal guarantee that the shoes are always worth the price paid for them. The prices are the same everywhere—they cost no more in San Francisco than they do in New York.

W. L. Douglas shoes are sold through our own stores direct to the wearer at one profit. All middlemen's and manufacturing profits are eliminated. By this method of marketing our shoes, W. L. Douglas gives the wearer shoes at the lowest possible cost.

W. L. Douglas $7.00 and $8.00 shoes are absolutely the best shoe values for the money in this country. They are the leaders everywhere. W. L. Douglas $9.00 and $10.00 shoes are made throughout of the finest leather the market affords, with a style endorsed by the leaders of America's fashion centers; they combine quality, style and comfort equal to other makes selling at higher prices.

W. L. Douglas shoes are made by the highest paid, skilled shoemakers, under the direction and supervision of experienced men, all working with an honest determination to make the best shoes for the price that money can buy.

CAUTION

Insist upon having W. L. Douglas shoes with his name and price stamped on the bottom.

If W. L. Douglas shoes cannot be obtained in your vicinity, order direct from factory by mail, Parcel Post charges prepaid. Write for Illustrated Catalog showing how to order by mail.

W. L. Douglas

President W. L. DOUGLAS SHOE CO.
128 Spark St., Brockton, Mass.

The New *Indian*

Here it is—the new INDIAN Scout Model G-20! The practical motorcycle for the thousands! The motorcycle of the future! New in conception—new in design—new in construction—new in a hundred important details.

Vision and courage built it—made it powerful, strong and sturdy like its famous predecessors in the INDIAN line—made it one hundred pounds lighter than its big brother—the INDIAN Powerplus.

Beautiful, well balanced and mechanically perfect, the new INDIAN Scout sets the high water mark as an ideal middleweight motorcycle. It's evolutionary in that some principles of design of the past have been discarded and new theories of construction, assured by gruelling, practical experience, have been incorporated.

And INDIAN dealers the world over have taken to the INDIAN Scout like wild fire. Personal visits to the factory and peremptory orders for deliveries, rush orders by telegram and letter and cable from far points from dealers, even before seeing the demonstrating model, have assured a wonderful production for 1920.

But the new marvelous middleweight model is only one feature of the new season's INDIAN line. A wonderfully improved bigger valved INDIAN Powerplus with exclusive Cradle Spring Frame for the maximum in power and speed and riding comfort, and the electrically equipped INDIAN Powerplus with two unit ignition and lighting system are outstanding features of the INDIAN 1920 motorcycle offerings.

INDIAN Leadership—supreme for many years—is now assured for all the years to come.

See your INDIAN dealer ***today.*** ***Phone*** him. Get an immediate demonstration of the motorcycle marvels.

HENDEE MANUFACTURING COMPANY
Dept. 37, SPRINGFIELD, MASS.
The Largest Motorcycle Manufacturer in the World

PRICES:
Model G-20 — $295
Model N-20 — $360
Model NE-20 — $390
(f.o.b. Factory plus War Tax)

Money-Back Cartridges

U. S. Cartridges are sold with the broadest guarantee ever made on ammunition. It is simply this: If you don't like them, get your money back.

We have authorized every dealer who carries U. S. Cartridges to refund, on demand, the price of the whole box to anyone who doesn't like them, and returns the unused part of the box.

US CARTRIDGES

For all makes of firearms

There is no 22 Long Rifle cartridge as accurate at all distances from 50 to 250 yards as U. S. 22 N. R. A. Long Rifle Lesmok Cartridges. This is 50 more yards of accuracy than has hitherto been possible with 22 rim-fire ammunition.

Solid bullet for target work. Hollow-point bullet for small game. Cost no more than ordinary cartridges. *Send for a copy of The U. S. Game Law Book—Free.*

UNITED STATES CARTRIDGE COMPANY, 111 Broadway, New York

We make exactly the same guarantee with

US BLACK SHELLS
Smokeless and Black Powders

You can get your pet load in smokeless or black powder in The Black Shells and your money back if you want it.

Thousands of shooters claim they take less "lead," shoot closer, with The Black Shells because they are as quick as lightning. They are positively waterproof, too.

General Selling Agents: National Lead Company, Boston, Buffalo, Cleveland, Chicago, St. Louis, Cincinnati; United Lead Company, New York, Philadelphia; National Lead and Oil Company, Pittsburgh; James Robertson Lead Co., Baltimore; American Smelters Securities Co., San Francisco; Hingston-Smith Arms Co., Winnipeg; John Hallam, Ltd., Toronto.

To Owners of AC-Equipped Cars

Is your engine running as smoothly or as powerfully as you have the right to expect?

If not, ask yourself whether you have played fair with the manufacturer of the car you drive.

Do you always insist that your dealer give you AC Spark Plugs when you ask for them—or do you permit him to sell you something "just as good"?

The manufacturer of your car chose AC Spark Plugs as standard equipment because he found AC Spark Plugs best suited to the needs of his product.

His choice was the result of exacting tests conducted by his chief engineers—tests in which all other plugs had the opportunity to qualify.

The manufacturer knows how important the proper spark plug is in the successful functioning of his engine. Profit by his experience; follow his judgment; always demand and get AC Spark Plugs.

Most fine passenger cars and most trucks and tractors of established reputation have AC's as standard equipment.

No matter what car you drive you can secure an AC Spark Plug that has been specially designed for it. For there are various types of AC Spark Plugs designed for every make and style of engine.

Champion Ignition Company
FLINT, *Michigan*

U. S. Pat. No. 1,135,727, April 13, 1915, U. S. Pat. No. 1,216,139, Feb. 13, 1917, Other Patents Pending

The Standard Spark Plug of the World

To the Country Every Sunday With Your "World's Champion"

To your favorite lake or stream or country resort—hunting, fishing, or just touring—every Sunday is a real vacation when you have a Harley-Davidson.

The whole countryside is yours to enjoy, for miles mean just pleasant minutes when you ride "The World's Champion." You will ride it to work and back every day, skimming past the crowds and the street cars; you'll spin out into the country 'most every evening after supper, and when Saturday comes—Oh, boy!—over the hills and away you go!

Harley-Davidson

"World's Champion"

is the cheapest form of quick travel—40 to 60 miles on a gallon of gasoline—its cost of upkeep, fuel and tires should never bother you.

Speed? Dependability? Read over the record of recent Harley-Davidson triumphs on track and road and judge for yourself.

You appreciate mechanical excellence. Let the Harley-Davidson dealer show you the kind of workmanship that goes into this motorcycle. Ask him about his easy payment plan.

Harley-Davidson Motor Co.

Milwaukee, Wisconsin

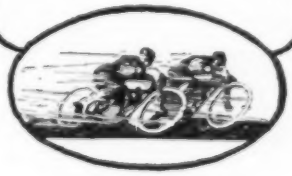
National Champion
World's Champion

Harley-Davidson won 200-mile National Championship at Ascot Speedway, Los Angeles, June 22nd. Won all five places.

Harley-Davidson won 200-mile World's Championship, Marion, Indiana, September 1st. Finished first, second, third.

Harley-Davidson holds Three-Flag Record (Canada to Mexico) for both Heavy and Medium-Weight machines.

Harley-Davidson holds New York to Chicago record.



BUY TODAY 10 MONTHS TO PAY

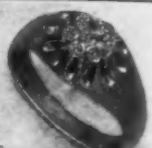
X-68 Massive flat Belcher ring; one fine diamond. $60.

X-69 Twelve beautiful diamonds, platinum set, surround a blue faceted sapphire. $115.

X-70 One sparkling blue-white diamond set Tiffany style. $75.

X-71 Graceful pattern of white gold, set with seven perfectly cut, blue-white diamonds. $85.

X-72 Solid gold Tiffany style ring; one blue-white diamond. $45.



X-73 Massive seven-diamond cluster ring. $85.

X-74 Exquisite diamond, hexagon-set in platinum mounting. $125.

X-75 Gentlemen's solid gold tooth ring, set with one fine diamond. $50.

X-76 Gentlemen's massive seven-diamond platinum-set cluster ring. $75.

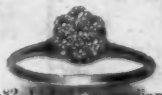
X-78 Tiffany style solid gold ring; one fine diamond. $100.

X-77 Pretty lavalliere set with one fine diamond and one genuine whole pearl. $25.

X-79 Ladies' Belcher ring set with one fine diamond. $35.

X-80 "Merry Widow" style; five perfectly cut, platinum-set diamonds. $100.

X-81 Solid gold Tiffany style ring; one fine diamond. $25.



X-82 Ladies' seven-diamond platinum-set cluster ring. $85.

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Any of these Splendid SWEET Specials sent ON APPROVAL at our expense. If entirely satisfied after examination, pay only $\frac{1}{8}$ of price; **balance in ten monthly payments.** SWEET'S Policy: You must be satisfied or no sale.

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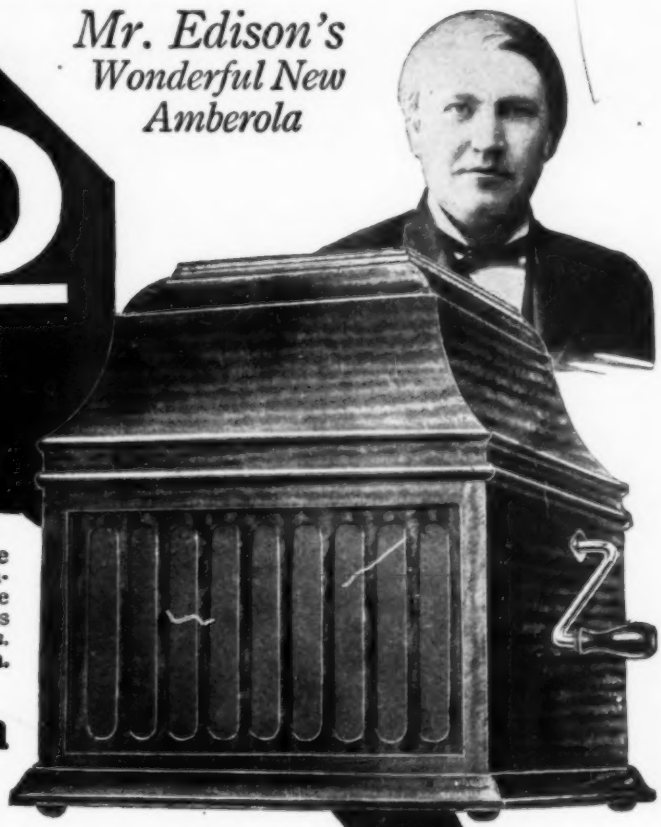

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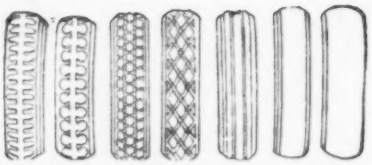

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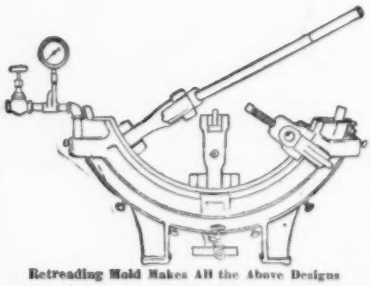

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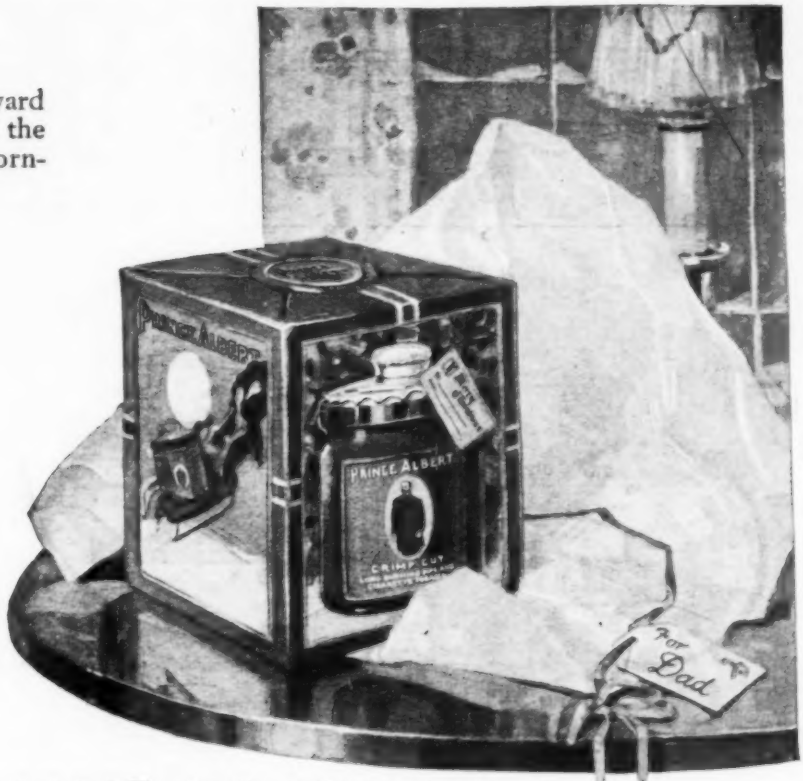

HOW that low-on-luck feeling will peel off *his* mind when the happy-handout-happens Christmas morning; and, his keen eye sights the stage all set with the pound crystal glass humidor of Prince Albert tobacco gowned in the glories of a radiant holiday rainbow! Turkey takes to the tall timbers compared with the all-star-feast *you* spread so temptingly before his smokeappetite!

PRINCE ALBERT for Christmas, lands on a man's tank-of-thanks like a spill-of-snow when the sleigh-bells are rusty from lack of jingles! P.A. as a *man-gift* is the high-sign, the last word, the directest route to his comfort, his contentment, his smoke-happiness! It's the touch-that-lifts-the-lid; that takes the awkward angles out of the evergreen-and-holly atmosphere and makes the family think and talk in one language!

YOU'LL enjoy seeing *him* fuss his old jimmy pipe all brimful with Prince Albert! Or *getting his* "rolling his own!" Never was such a delightful makin's cigarette as P.A. supplies! He can smoke the limit with Prince Albert *for it can't bite his tongue or parch his throat!* Our exclusive patented process fixes that! He'll just want to get thirty-six-smoke-hours out of the legal twenty-four, *that's all!*

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PRINCE ALBERT is also sold in handsome pound and half pound tin humidors, in tidy red tins and in toppy red bags—wherever you buy tobacco.

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the national Christmas joy smoke

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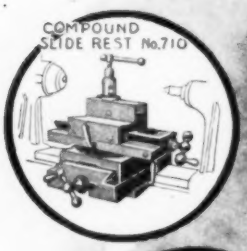

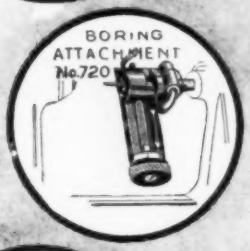

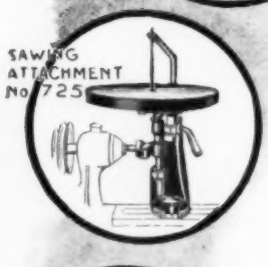

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This lathe is particularly adapted to small precision work such as is usually done in the laboratory. Doctors, dentists and inventors will find it exceedingly useful in their laboratories.

This lathe has a 12-inch bed and an extreme distance of 3½ inches between centers. It swings 5 inches. It has a draw-in spindle with a 3/16-inch hole clear through. The pulley has four steps for ¼-inch round belting. The Compound Slide Rest, Boring Attachment, Sawing Attachment and Milling Attachment shown in the circles, are intended for use with Precision Model Lathe No. 700. With these attachments an almost unlimited scope of work can be accurately and quickly accomplished.

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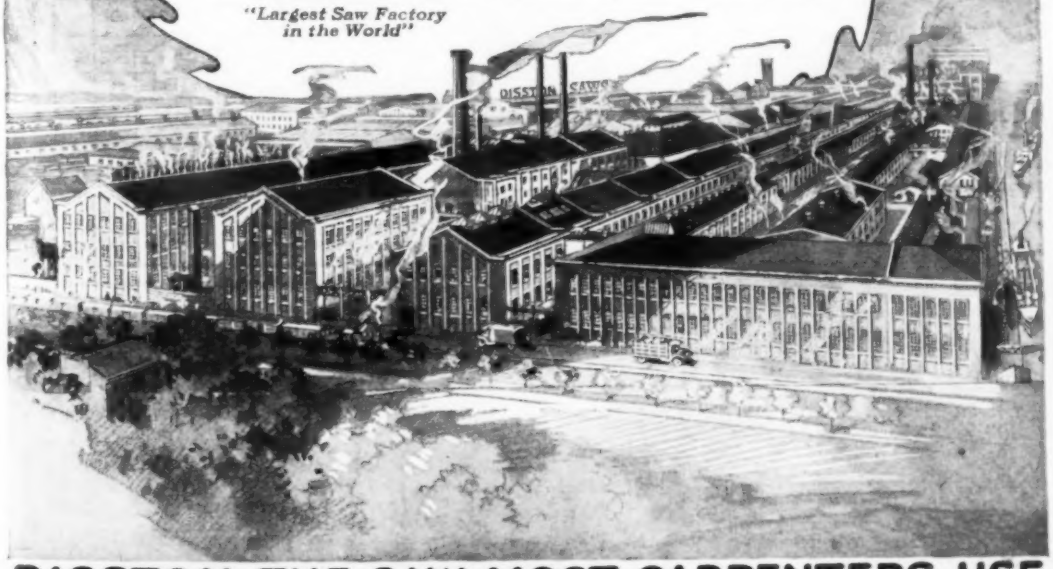

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the chart

Starrett Hack Saw Chart

MATERIAL TO BE CUT	No. of Blade for Hand Frame		No. of Blade for Power Machine			
	All Hard	Flexible or Soft Back	Light Machine	Medium Machine	Heavy Machine	Extra Heavy Machine
Light Angles, Channels, Tee Iron, Ornamental	102	282	118	262		
Heavy Angles, Channels, Tee Iron	102, 112	250	118-B	255		
Light Structural	112-B	250-B	118-B	255	254	256
Heavy Structural	112-B	250-B	114	255-B	254-B	256-B
Steel and Iron Pipe, Conduit and Brass Pipe	102	282	118	262	259	
Solid Stock, Cold Rolled, Machine Steel	102-B, 112-B	250, 250-B	114	255-B, 256-C	254-B, 254-C	256-B, 256-C
Tool Steel, Cast Iron	102, 112		114	255	254	256
Brass	102, 112		118	262	259	
Sheet Metal and						

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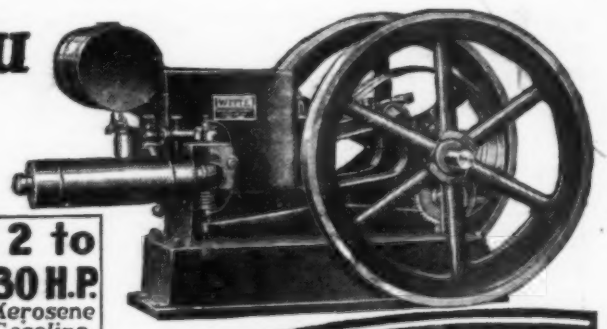

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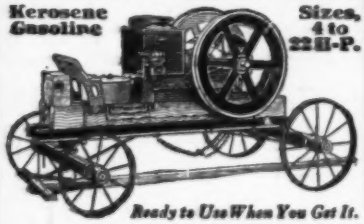

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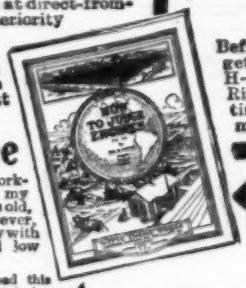

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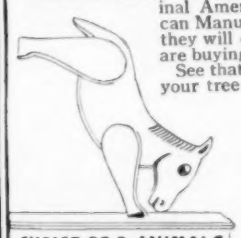

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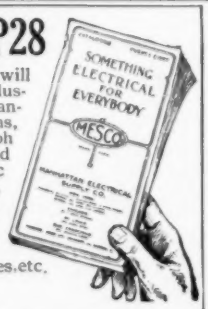

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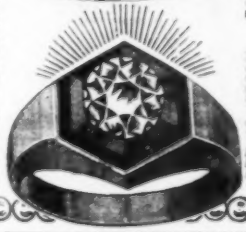

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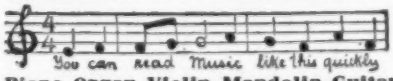

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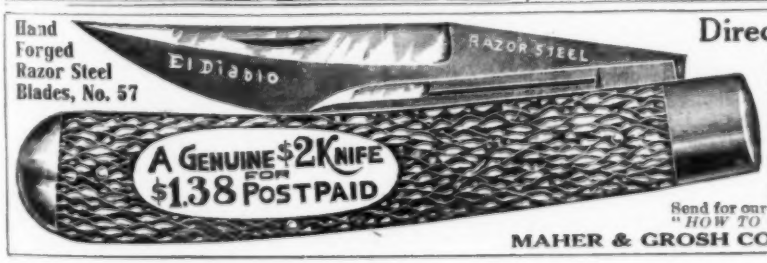

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The Depollier Waterproof Case now adopted by the Signal Corps of the United States Army for the saving of watch movements purchased during the war and for future use. Ordinary strap watches were not constructed to withstand the wear and tear of field duty. A heat-insulated disk protects the delicate movement from the injurious body heat of the arm, which has a tendency to dry or gum up the watch oil.

Waterproof Oxidized Case with 14-k Solid Gold Disk on Back and 15-J Waltham Movement $45.00

Patented

Stamped U. S. A. only for the U. S. Army

Write for Booklet

JACQUES DEPOLLIER & SON *Manufacturers of High Class Specialties for Waltham Watches*

15 Maiden Lane - New York, N. Y.

Dubois Watch Case Company, Established 1877

MONARCH LATHES

QUALITY construction and workmanship. Accuracy in operation and the ability to perform the same high class work as that of the more costly tool has established the leadership of the monarch line.

Quantity production of a high grade machine tool has made possible the low prices that place the MONARCH lathes within the reach of every large or small purchaser.

Made up to 30" swing, there is a Monarch lathe to do your work. Every one guaranteed to give satisfaction to the purchaser. **Write for catalog No. 11.**

America's Largest Lathe Builders

The Monarch Machine Tool Co.
100 Oak Street Sidney, Ohio.

AMERICAN TELEPHONE AND TELEGRAPH COMPANY
AND ASSOCIATED COMPANIES

One Policy One System Universal Service

Use An ARGUS MOISTENER

THE 20th CENTURY LITTLE WONDER

Moistens stamps and envelopes neatly and quickly. Handier and cheaper than any other stationery moistening device on the market. Our guaranty with every one provides for money back if not satisfactory. You take no chances on the *Argus*. Try it. **Price, Prepaid. . . . $1.50.**

Dealers and Agents Wanted.

ARGUS MANUFACTURING COMPANY
402 N. Paulina St., Dept. 17C, Chicago

Send for a Complete Catalogue of

MASONIC BOOKS Jewelry and Goods

REDDING & CO.

Publishers and Manufacturers

Dept. P 200 Fifth Avenue, New York

SUPERIOR SINCE 1904

Over 100,000 in Use

Mostly sold through recommendation. For PERSONAL DESK or GENERAL OFFICE. It checks mental calculations. Buy through your Stationer. Write for 10-day trial offer.

E. GANCHER, A.A.M. Co.
148 Duane Street, NEW YORK
CANADIAN AGENCY

Golden Gem PORTABLE Adding Machine $12

Multiplies - Subtracts

AGENTS WANTED

For CHRISTMAS!

Buy Your Columbia with Trolley Fares!

In three hundred and eighty-nine cities trolley fares have been increased. This number is growing daily.

These fares range from six cents to ten cents.

Fifty-five per cent. of the city population of the country is affected.

Those wasted fares would soon pay for a Columbia Bicycle.

A Columbia is sure to get you there—and back.

It makes you independent of uncertain running time—of delays.

It gives you freedom from crowded, stuffy cars.

It means needed, healthful, exhilarating outdoor exercise to keep you fit for the day's doings.

It means ownership of the highest grade, most serviceable bicycle on the market—*guaranteed* by the forty-year-old nameplate it bears.

In the 1920 Columbia Catalog you will find the exact model you want at the price you feel justified in paying. Copy sent immediately on request.

WESTFIELD MANUFACTURING CO.
Successors to Pope Mfg. Co.
15 Lozier Ave., Westfield, Mass.

Standard of the world!

Your WDC Pipe is bound to break in sweet and mellow, because it was made of specially Demuth seasoned French briar. It is unsurpassed in workmanship because it was fashioned by contented, self-governed workmen. And for these reasons it will give you the better kind of smoke. All good dealers sell WDC Pipes in your size and shape, and at your price.

WM. DEMUTH & CO., NEW YORK
WORLD'S LARGEST MAKERS OF FINE PIPES

Fine as silk!

The velvety Williams' lather leaves your face feeling fine as silk.

It sends you down to an early breakfast with a merry smile and a sense of complete comfort that starts the day right.

You don't really need as thick a mass of lather as the Williams' stick will give you if you want it. But some morning, just for fun, take a little extra time for working up the lather, and a little additional water, and see how rich and generous the Williams' lather can be.

But *every* day you get the same quick and soothing results—a shave that leaves no hard feelings.

The patented holder-top stick is an added convenience that grows greater the longer you use it.

Send 20c. in stamps for trial sizes of the four forms of shaving soap — Cream, Stick, Powder and Liquid. Or send 6c. in stamps for any one.

The J. B. WILLIAMS COMPANY
***Dept. A,* Glastonbury, Conn.**

After the shave or the bath, you will enjoy the comforting touch of Williams' Talc Powder. Send 4c. for a trial size of the perfume you prefer—Violet, Carnation, English Lilac or Rose.

Cream

Powder

Liquid

Williams' PATENTED Holder Top Shaving Stick

THE J.B.WILLIAMS CO.-GLASTONBURY, CONN.

Please Mention Popular Mechanics

You Can See The Spark
In The Top Of The Plug

The increased efficiency Viz-Sparks give to your motor is little short of marvelous. You'll scarcely believe it till you try them—and then you'll be so enthusiastic you'll want all your friends to have them. You can see the spark through a lens in the top of the plug—and you can not only see at a glance whether the plug is sparking, but the color and size of your spark accurately indicates the condition of your ignition. All this, together with proof of how Viz-Sparks give you an intensified spark, told in a little booklet which your dealer will give or we will send you by mail.

VIZ-SPARK
"The Plug With the Double Jump Spark"

Viz-Spark is an improved spark plug. It is as much of an advance over the average plug as the self-starter is an improvement over the crank start. You wouldn't think of abandoning your self-starter, and once you try Viz-Sparks you could not be induced to go back to other style plugs. This is a fact proven by the experience of thousands of users. In addition to visibility you absolutely and positively get a greatly intensified spark — ***and you know what that means!***

We want you to try Viz-Sparks, and if your dealer cannot supply you, order by mail. Give model of car and size of plug when ordering. Also, we will appreciate it if you will give us the name and address of your dealer.

What Viz-Spark Does

The intensified firing spark insures complete combustion;—
Complete combustion reduces carbon deposit to a minimum—
Complete combustion eliminates the fouling of plugs—
Complete combustion prevents sticking of valves—
Complete combustion eliminates necessity of frequent valve grinding—
Complete combustion makes possible a lean gasoline mixture—
Complete combustion insures gasoline economy—
Complete combustion insures maximum power under all conditions.
Intense firing spark makes cold weather starting easy.

What Viz-Spark Shows

A visible spark in the top of the plug shows the condition of the ignition and combustion system of the motor. The additional gap in the plug reduces the current taken from the battery to a minimum.

A small bluish white spark, when uniform on all plugs, indicates uniform compression and ignition on all cylinders.

A larger yellowish spark on one or more plugs indicates loss of compression or excess of oil in corresponding cylinder.

A large red spark indicates that the plug is not firing.

No spark indicates an open circuit in the wiring or distributor.

Guarantee Viz-Spark is built to last as long as the motor. Should any defect develop within one year from the date of purchase, return the plug to us and we will repair or replace it free of charge.

Dealers and Distributors, Write Us

Visible Spark Plug Co.
406 McKenna Bldg., Pittsburgh, Pa.

Price
$1.50
Mail Orders Filled Where Dealers Cannot Supply You

Saved From Such a Fate By PRESTO-FELT

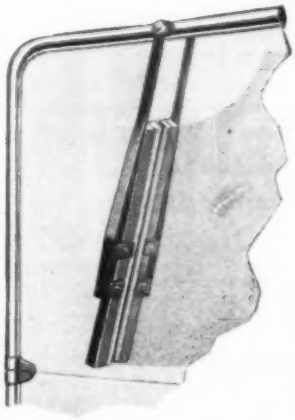
"The Windshield Cleaner That Fits Any Car"

Made to attach in any of three ways—clamps over top of windshield, bolts through frame or through the glass. Built exclusively for those who want to drive their cars in safety and who like others to exercise similar precaution as a guaranty against accidents.

Once Cleaned—Stays Cleaned

The Presto-Felt Cleaner is made with chemically treated felt pads which wipe the surface entirely clean, causing the rain to "flatten" out as it hits the glass, leaving a clean, "flat" surface through which the driver gets a clear view of the road ahead. No "beads" of rain to obstruct the view. Presto-Felt entirely eliminates that blindfolded effect. One cleaning sufficient in any storm.

Showing Cleaner attached by drilling directly through Glass



Cleaner attached through rim of windshield.

Fits Tight—Can't Rattle

Holders are made of high quality, oil-tempered spring steel, insuring positive pressure which thoroughly cleans and a uniform tension which prevents cleaner from rattling or dropping down in line of vision. The double felt pads keep both sides of glass thoroughly cleaned.

Simple in construction; extremely efficient in operation.

PRICE $2.00 Complete With All the Necessary Attachments

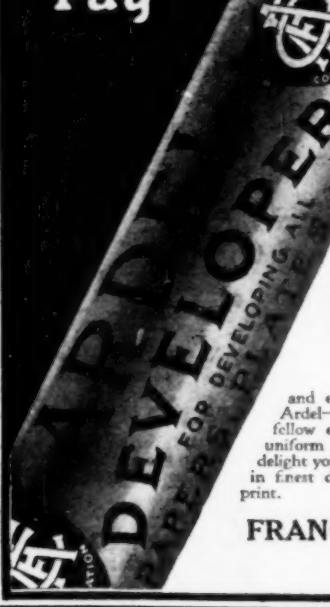
At your dealer's or sent direct on receipt of price and your dealer's name.

Dealers Wanted Everywhere

PRESTO-FELT MFG. CO. 32 Presto Building 120 NO. ERIE ST. Toledo, Ohio

A Safe Developer *for* Papers, Plates *and* Films

"The Safety Way and No More to Pay"



ASK for Ardel Developer—the long-lasting, non-poisonous developer, created by famous *French* experts of photographic chemistry and perfected by *Americans* to a basis of economical commercial utility.

Aside from its non-poisonous feature, this wonderful developer simplifies the mechanical process of developing to such an extent that for several years it has been a favorite of the professional Photographic Artist. Ask for

ARDEL DEVELOPER

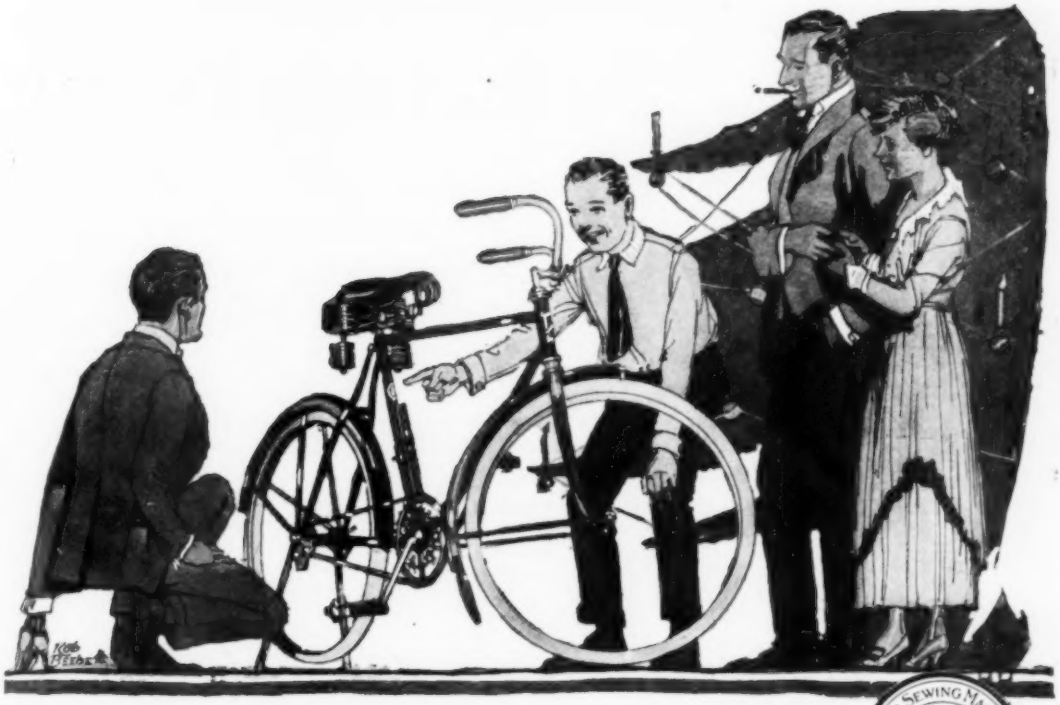
Efficient, Safe, Economical

and enjoy the perfection and the safety of Ardel—in conjunction with your more advanced fellow enthusiasts whose living depends upon uniform good results. Ardel will surprise and delight you. Its smooth, even operation brings out in finest detail every possibility of a negative or print.

To Obtain Ardel

Both professionals and amateurs—inquire for Ardel from your usual source of photographic supplies. If not immediately available, send 10 cents for a tube to cover postage and send name of your dealer or jobber.

FRANCO AMERICAN CHEMICAL CORPORATION
1430 Altgeld Street, CHICAGO, ILLINOIS



We back this Trade-Mark with our Reputation.

THE DAVIS SEWING MACHINE CO. DAVIS MADE DAYTON, OHIO.

What One Father Learned *Last* Christmas

"Do you know—you fathers and mothers—actually HOW much that boy of yours *wants* a bicycle? Let me tell you.

"I'm a father—and MY boy wanted a bicycle. But like many fathers, I kept putting him off from Christmas to Christmas.

"Finally, LAST Christmas I bought him a bicycle—and I wish you could have seen that youngster Christmas morning.

"There in the middle of the room stood his new *Dayton* bike—bright and shining. And so were his eyes.

"He walked around it—studying its delights from every angle—and finding new ones at every step. And forgetful of everything and everybody—lost in his delight—I heard him saying to himself—over and over:

" 'It's almost too good to be true—too good to be true. And I won't have to borrow rides on Jimmy's bike any more—or get off whenever he tells me to!'

"I thought I knew how much a boy wanted a bicycle—but I NEVER knew until that Christmas morning. And my joy was tempered only by the soul-felt wish that I had REALIZED the tuggings that besiege a boy's heart—and made him THAT happy before."

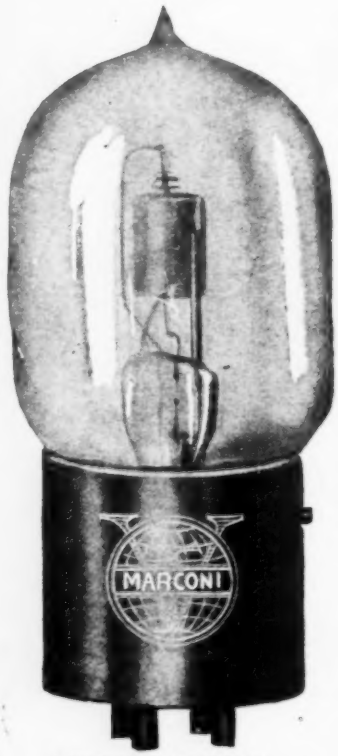
A *Dayton Bicycle* will make YOUR boy—or anybody—happy THIS Christmas—and YOU, too! See the Dayton dealer in your community—or write us for Catalog 45.

Cycle Dept., THE DAVIS SEWING MACHINE CO., Dayton, Ohio

Dayton Bicycles

The Heart of the Wireless

An Amateur Station Without a Vacuum Tube is Years Behind the Times



Fleming Pat. No. 803684
De Forest Pat. Nos. 841387-879532

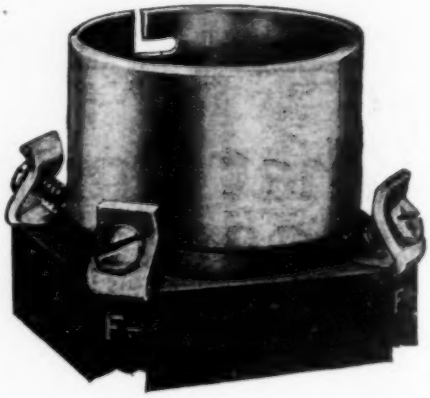
Marconi V. T.

$7.00 each

Under agreements recently effected the Marconi V. T. is the only vacuum tube, or audion, which may be sold to amateurs, laboratories, schools of instruction and experimenters.

The approximate operating life of the MARCONI V. T. is 1,500 hours

Standardized Socket $1.50 Additional



Class I—Designed for use as a detector; operates with plate potential of 20 to 60 volts.

Class II—Designed for use as an amplifier; plate potentials from 60 to 110 volts may be applied.

Tubes in either class may be used for detection or amplification, but those of Class I are best as detectors, and Class II tubes are superior as amplifiers.

Standard Resistance, Complete $1.00

The Marconi Resistance, connected in the circuit between the grid and the filament of the Marconi V. T., is made in the following standard sizes:

½ megohm, 1 megohm, 2 megohms, 4 megohms, 6 megohms.

Resistances of any special fractional values up to 6 megohms can be supplied.

Send all remittances with order to COMMERCIAL DEPARTMENT

Marconi Wireless Telegraph Co. of America

229 Broadway, NEW YORK

Retail Office and Exhibition Rooms—25 Elm St., New York

Sole Distributors for De Forest Radio Telephone & Telegraph Co.

BRANCH HOUSES:

Schofield Bldg., Cleveland, Ohio
American Bldg., Baltimore, Md.
Insurance Exch. Bldg., San Francisco, Cal.
136 Federal St., Boston, Mass.
301 Commercial Bank Assoc, New Orleans, La.
109 South Second St., Philadelphia, Pa.

Strength is the dominant feature of ~ DURACORD

TRADE-MARK

This is Duracord. Thick, heavy strands, woven like a piece of fire hose, not braided. Picture shows outside covering only with impregnating compound removed.

DON'T believe that Duracord is the best portable electric cord made until you prove it to yourself. Send for samples of Duracord and the ordinary braided cord. Test them any way you please. Show them to your electrician or superintendent. You will readily see the superiority of Duracord.

For any portable electric cord that is subjected to hard service and abuse, mechanical strength is absolutely essential. You get this strength in Duracord—because it has a special covering of fine quality cotton *woven* like fire hose—*not braided.* This weave gives the covering a wear resisting quality without which the best of copper and insulation are wasted.

Ask your electrical jobber about Duracord or write us.

Here is the ordinary braided cable covering. Note the open and porous construction, easily cut, stretched or unraveled. Compare it with the illustration of Duracord above.

TUBULAR WOVEN FABRIC COMPANY

Pawtucket, R. I.

Makers of Duraduct, Flexible Non-Metallic Conduit

Please Mention Popular Mechanics

Let Our Graduates Repair Your Autos Trucks and Tractors

THEY ARE TRAINED IN DETROIT
-The Auto Center-In The Factory-Endorsed School

Michigan State Auto School students are trained as the auto manufacturers and their service managers want them trained. The auto manufacturers and service managers have assisted us in every way in outlining our course. They work with us continually and furnish us their latest equipment in order that we may turn out thoroughly competent-trained men. **They heartily endorse the M. S. A. S.**

8,000 Graduates Trained to Help You

Factories, service stations and garages throughout the country are calling for Michigan State Auto School trained men. Dozens of requests come to us daily. Why? Because the men we turn out are trained along practical lines. They are far ahead of the fellows who have just knocked around garages and factories picking up what little knowledge they could. Our students are thoroughly **trained from the ground up by factory-endorsed methods.** They are given theory as well as practice;—trained in both head and hand,—trained to **think** and **do.** The factories will tell you that our students must pass very rigid examinations before they can obtain diplomas. Our graduates make good and are successful because our Course teaches them how to locate trouble quickly and correct it successfully.

Here is the TRADE MARK by which our graduates are known

—and here is one group of our students training to serve you

These Men Are Trained to Give Practical Auto Service!

Throughout our entire course of instruction thoroughness, accuracy, fair treatment and application are made the cardinal principles. This careful training greatly benefits the student, the car owner and the industry generally.

Our Graduates Can Help You

Next time you need repair work for your auto, truck or tractor, let an M.S.A.S. graduate show that he can do the work as it should be done. If you don't know where to find one, fill out and send us the Coupon below and we will gladly send you a list of them in your vicinity.

Notice to Our Graduates

Every graduate of the Michigan State Auto School, no matter whether in business or holding a good position, is requested to write us at once, giving his name and present business address so that we can publish it in the M.S.A.S BlueBook of Trained Automobile Men.

It Pays to Let an M. S. A. S. Graduate Do Your Auto Repair Work

MICHIGAN STATE AUTO SCHOOL

"The Detroit Auto School" — *"In the Heart of the Auto Industry"*

3712 Auto Building
687-89-91 Woodward Ave. **Detroit, Mich., U.S.A.**

Use These Special Service Coupons

If you want the service of a Trained Auto Man
Sign and Mail This Coupon

MICHIGAN STATE AUTO SCHOOL, 3712 Auto Bldg., 687-91 Woodward Ave., DETROIT, MICH.

GENTLEMEN: Please tell me where I can get in touch with one of your graduates to do expert repair work on my car.

NAME

STREET

CITY STATE

NUMBER OF CARS? TRUCKS? TRACTORS?

If you want to learn the Auto Business
Sign and Mail This Coupon

MICHIGAN STATE AUTO SCHOOL, 3712 Auto Bldg., 687-91 Woodward Ave., DETROIT, MICH.

GENTLEMEN: Please send me your Free Catalog, and information on Course checked below.

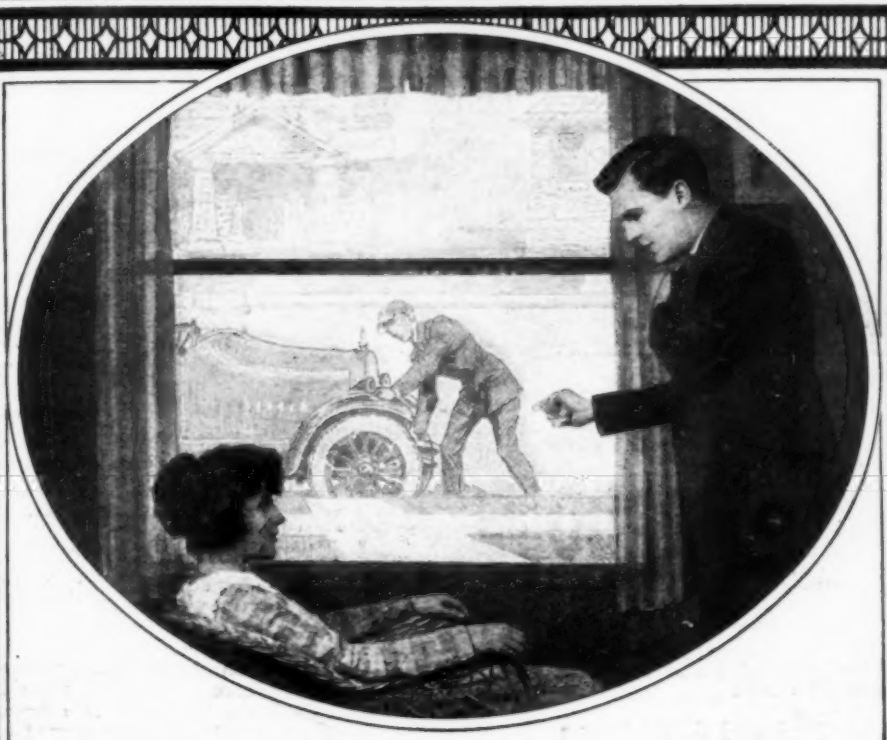
[ ] **Auto-Tractor Course** [ ] **Tire Repair** [ ] **Brazing & Welding**

NAME

STREET OR R. F. D.

CITY STATE

PRESENT OCCUPATION



"THE crank handle kicked back and struck my arm a hard blow. I was badly bruised, but Sloan's Liniment soon relieved the ache and pain!"

For the stiffness of long-continued hours at the wheel, "auto leg," and the general soreness attendant upon hard driving, Sloan's Liniment is wonderfully effective in producing prompt, thorough relief.

A counter-irritant, it soon scatters the congestion and *penetrates without rubbing* to the afflicted part. Brings a comforting tingle of warm relief from all external aches and pains—Rheumatic Twinges, Sciatica, Lumbago, Neuralgia.

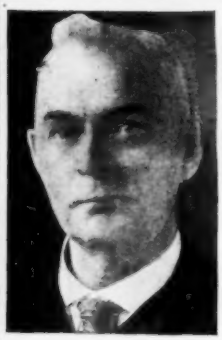
Every autoist should keep it handy. Three sizes—35c, 70c, $1.40.

At all druggists.

Sloan's Liniment The World's

KEEP IT HANDY

Save TIRES LIKE THESE



I Earned $2200 IN Four Months

This is Richard A. Oldham

Mr. Oldham was telegraph operator for the Illinois Central Railroad for twenty years. He is fifty-eight years old. One day he read one of my advertisements and the possibilities of making money in the Auto Tire Surgery Business. In a few weeks he had purchased and installed a Haywood outfit. A short time afterward he wrote us that his income in four months was as much as it had been in Two and One-Half years as Telegraph Operator.

Earns $800 Month

This is E. T. Buchmann

He is a Tire Surgeon at 4903 N. Clark St., Chicago. He says: "Am earning $800.00 per month, and confining myself solely to re-building of Tires by Haywood Method."

Be a TIRE SURGEON

Make $2,500 to $4,000 Per Year Giving New Life to Old Tires.

It is being done—by the wonderful new Haywood Method of Tire Surgery. It is one of the great results of the war. A Haywood Tire Surgeon can do more with old tires than was even dreamed of before the war. By the **Haywood Method a Haywood Tire Surgeon** can give 4,000 to 5,000 more miles of new life to a tire, that two years ago would have been thrown on the junk pile. As a surgeon saves human lives by his operations, so by **Haywood Tire Surgery,** you can save and lengthen the life of old tires. And it's easy to learn.

HAYWOOD'S TIRE SURGERY

Stations Are Needed Everywhere

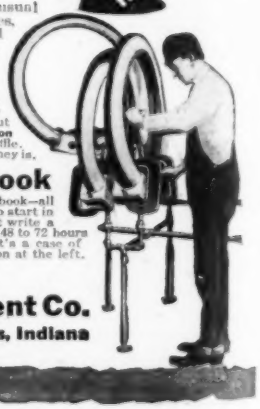
20,000,000 tires wearing down every day. By Tire Surgery, you can quickly repair, rebuild and give new life to tires seemingly all worn out. Cuts, gashes, tears, bruises, broken fabric, every kind of an accident that can happen to **any** tire, inside or out, you can repair and save for long service. **The chance to make money is simply wonderful.**

WITH THIS HAYWOOD OUTFIT

$2,500 to $4,000 A YEAR Is Possible

During the war the nation needed an unusual service to keep the thousands of automobiles, ambulances and aeroplanes going day and night. HAYWOOD TIRE SURGERY met the demand.

If we told you all the truth you wouldn't believe it. You would say, "it is too good to be true". But you can see what a great field there is for **Haywood Tire Surgery Stations** — for this better way. You have eyes. You see why there **must** be wonderful chances to make money. Put to see—to know—is **not enough.** It is **action—decision** that counts these days. The man who waits, gets lost in the shuffle. **It is the resolute will to follow your bunch that lands** you where the money is.



WRITE TODAY

M. HAYWOOD, President
Haywood Tire & Equipment Co.
649 Capitol Ave., Indianapolis, Ind.

DEAR SIR: Please send me by return mail your free book on the new Haywood Tire Surgery Method and the details of your free school of tire repairing.

Name.....

Address.....

.....

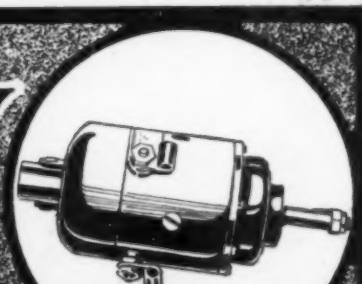
Send Today For My Free Book

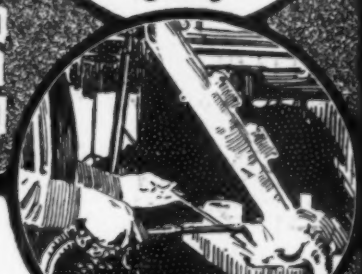
I have ready to mail you the day I get your request, a fascinating book—all about tires—how to repair them by the Haywood Method—how to start in business—how to build up trade—what to charge. You needn't write a letter—just tear out the coupon right now, fill it in and mail. In 48 to 72 hours you can have the whole proposition right in front of you. It's a case of walking right into $2500 to $4000 a year and up. Use coupon at the left.

M. HAYWOOD, Pres.
Haywood Tire & Equipment Co.
649 Capitol Avenue Indianapolis, Indiana

Repair Any Auto or Auto Truck

Examine These NEW AUTO BOOKS FREE

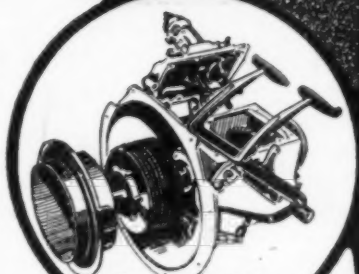




Be an expert auto repair man. You can have the skill that makes every complicated trouble as easy to fix as taking out a spark plug. Learn every detail of all makes of cars and trucks. Know exactly how to find what's wrong and how to make all repairs quickly. These great new Auto Books show you how.

Make Money Repairing Autos

The limited output of new cars in 1918 did not anywhere near meet the demand. Rebuilt cars are selling at a premium. Never before have expert auto repair men been in such great demand and made so much money. Now is your great money-earning opportunity in the auto repair business. Every mechanic, every chauffeur, every car owner needs this great **New Library of Automobile Engineering.**



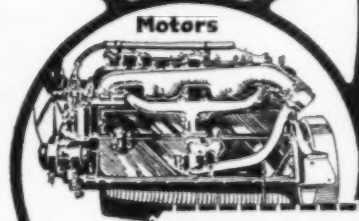
Tells About

Explosion Motors, Welding, Motor Construction and Repair, Carburetors and Settings, Valves, Cooling, Lubrication, Fly-Wheels, Clutch, Transmission, Final Drive, Steering, Frames, Tires, Vulcanizing, Ignition, Starting and Lighting Systems, Shop Kinks, Public Garage Design, Equipment and Operation, Electrics, Storage Batteries—Care and Repair, Steam Cars, Motorcycles, Commercial Trucks, Glossary. More than 100 blue prints of Wiring Diagrams.

50c a Week

If You Decide to Buy

Let us send you the complete six-volume set of Automobile Engineering for one week's examination. Read the simple directions for repairing every automobile trouble. Six thick volumes, 5½ x 8¾ inches, flexibly bound in American morocco. 2,650 pages, 2,100 illustrations, wiring diagrams, etc. Everything in plain, every-day language, simple to understand. If you decide to keep them, send only $2 in seven days, and $2 a month thereafter until the special introductory price of $19.80 has been paid. The regular price is $30.00, so you save $10.20 by acting at once.



Send No Money

Don't send a penny! Your name and address in the coupon brings the six books to you at once for seven days' trial. With each set we give you absolutely free a $12 Consulting Membership, entitling you to ask our staff of automobile experts as many questions as you wish, a whole year free.

Mail Coupon NOW

American Technical Society
Dept. AA-199, Chicago, U.S.A.

AMERICAN TECHNICAL SOCIETY
Dept. AA-199, CHICAGO, U.S.A.

Please send me the six-volume set of Automobile Engineering for seven days' examination, shipping charges collect. If I decide to buy I will send $2.00 within seven days and balance at $2.00 a month until $19.80 has been paid. Then you will send me a receipt showing that the set of books and the Consulting Membership are mine and fully paid for. If I think I can get along without the books, I will return them, after 7 days, at your expense.

Name.....

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Please fill out all lines.

TALKING MACHINE Complete Outfit $5.98

With Three Double Face Emerson Records and Package of Needles

A real talking machine, not a toy. Plays real disc records just like expensive machines. It is constructed entirely of steel, with a wonderfully easy running motor. You'll like its clear, loud tone, particularly bringing out, as it does, the full charm of the music it plays. It can be adjusted to play fast or slow, soft or loud, as you prefer, but, above all, it has been so strongly constructed that it will stand lots of rough handling. A fine machine for indoors or to take with you outdoors, camping, canoeing, dancing—whenever you need music.

We include, FREE, three double faced records, your own selection, and a supply of needles. You get the machine, needles and records—all at one bargain price—$5.98. In ordering, select records from the following, or order your machine and select your records after complete list reaches you.

Select Your Records

I'm Forever Blowing Bubbles / By the Campfire—Duet	7495
Dear Old Pal of Mine—Solo / Some Day I'll Make You Glad—Solo	7496
If It Comes from Dixieland / Rose of My Heart—Tenor Solo	7497
Peter Gink—One Step / Some One Step—One Step	7479 Band
How Ya Gonna Keep 'Em—One Step / What's That—Fox Trot	7480 Band
Now You Gotin' t' Wet Your Whistle? / St. Louis Blues—Character Song	7477
In the Land of Beginning Again / Oh, Promise Me	7486

GENUINE GILLETTE $4.59

The story is all in the headlines—this is a standard $5.00 razor, silver plated—with 12 Gillette Blades—the best money can buy. Order it either in leather case, or vest pocket pattern, at this very special price of $4.59.

Gillette Blades

These are standard Gillette blades—40c in ½ dozen pack—85c in dozen pack.

Automatic Cigarette Case, 25c

Hands them out one at a time. The slickest thing you ever saw. Case is nickel-plated, in fancy design, strongly built to last you for years. Men find it most convenient style of cigarette case. Keeps cigarettes in good condition.

HAMMERLESS REVOLVER $10.98

Not a "Baby" but a regulation man's size. Harrington and Richardson Hammerless Revolver. Order by calibre, either size, $10.98 special.

22 calibre, rim fire, 7 shot, 3-inch barrel nickel-plated, 22 short, long or S. & W. cartridge.

32 calibre, centre fire, 5 shot 3-inch barrel, nickel-plated, 32 S. & W. cartridge.

38 calibre, center fire, 5 shot, 3½-inch barrel, nickel-plated, 38 S. & W. cartridge.

MUSCLE BUILDERS $1.49

Attach these easily to your wall and use them regularly. Watch your muscle grow. These splendid exercisers for developing muscles have extra coil springs, with Japanned handles, cut to fit the hands. They can be adjusted readily to the floor or wall, at all angles, and will be of enormous value in developing the muscles of the chest, back and arms.

50 Shooter Automatic CAP PISTOL 29c

And Box of Ammunition

Bangs with 50 deafening roars, one after another, as quick as you can pull the trigger. **REPEATING CAPS**, to fit this pistol, come in rolls of 50 shots each at 5c a box. Pistol alone without ammunition, 29c.

Men's Raincoat $7.49

Guaranteed Rainproof

This is a sporty looking substantial raincoat at a price so reasonable no man can afford to risk getting wet, by going without one. It comes in a snug fitting model, becoming to young and old, with big patch pockets, adjustable military collar and a belt at the waist. Made of rubberized fabric, in olive drab color. An unusual value.

SOAK 'EM WATER PISTOL 25c

Looks like a genuine automatic, made of steel, with no rubber bulb to get out of order. Because of the powerful air pressure of the cylinder it will squirt a large stream of water to a great distance. Can be carried in the pocket and used when the other fellow is not looking. Great for fun or self protection.

Catalog FREE With Every Order

With every order received, we will forward, FREE, a copy of our new 1920 catalogue containing many pages of valuable articles at bargain prices. Remit full amount of your order in currency, postal or express money order or 2c stamps. We prepay all postage and express charges. Satisfaction guaranteed, or money back.

Handy Man Combination Pen Knife $1.69

Knife, screw driver, bottle and can opener—all in one. The handiest pocket knife a man ever had. Ideal for camping, outing and every-day convenience. Made of finely tempered steel, brass lined and contains one large blade, screw driver, bottle opener and can opener. Has a stag handle, with ring for attaching to your key chain.

Jack Knife, 69c

An inexpensive, sturdy knife, built to stand constant use. Stag handle, one large and one small blade, both made from the best Wardlow English steel, with keen edges. It is lined with brass, and has nickel silver bolsters. A splendid knife at our special bargain price of 69c.

Wrenches 10 In 1

These wrenches come with five nickel plated end wrenches, that, with the aid of the thumb bolt in the centre will fit ten size nuts. You'll find them compact and convenient, ready for any job, when you want them. **89c Per Set.**

STURDY ELECTRIC MOTOR 99c

You'll find this a strong, sturdy, two terminal electric motor, just the thing for operating light running models and electrical toys. Can be run with one or more dry or wet cell batteries, depending upon the power desired.

Novelty Knife and Bottle Opener 98c

This knife is bound to Appeal to the men. The handle is in the shape of a leg, with the shoe end forming a bottle opener. The two fine steel blades open easily, and fit back in the handle when not in use.

Genuine CAMERA EASTMAN BROWNIE $2.86

Makes pictures 1¼x1¼. Is accurate, reliable, efficient and economical to operate. Anybody can make good pictures with it. Has the automatic shutter for snapshots and time exposures. Carefully tested lens and view finders, for vertical and horizontal exposures. These simple and reliable box cameras have stood the test of years and proved a delight to all who have used them.

Complete PRINTING PRESS $1.50

Every man and boy will find this printing press both useful and instructive. It will print cards, tags, envelopes and announcements. It is made of cast iron, rubber type, cards, ink, bronze tweezers and full instructions come with every press and any child who can read can operate it.

HUNTING KNIFE 60c

A great knife for hunting, camping, fishing and all sorts of outdoor work. It comes with a 4-inch heavy steel blade, finely tempered, with ebonized handle, fitted to your grasp. Every knife comes in a genuine leather sheath, with slits in the end through which to slip your belt.

Luminous WATCH $2.75

Shines in the Dark

The only cheap thing about this watch is the price, for you'll find it the all-round handiest timekeeper imaginable. It has the luminous dial that makes it easy to see the time, no matter how dark the night, and a nickel-plated case that will stand the hardest sort of usage. It is fully guaranteed, of course.

Pocket Flashlight 39c

Very Special

A flashlight that fits in your vest pocket, all ready for service, when you need a good, clear light. Comes with nickel plated case, equipped with a very bright bulb and a 2-cell battery. The price of 39c is a very special one—for this occasion.

GIANT RAY FLASHLIGHT 99c

Very Powerful

This is a genuine Tungsten flashlight, five inches long, with a powerful light, in a lightweight, vulcanized fibre case. It flashes on with a pressure of the button, and will stay lighted by using the slide switch with which it is equipped. Carefully packed, complete for 99c.

LEARN A TRADE $1.00

With the Help of one of these Books

Modern Electric Illumination
Elementary Electricity
Wireless Telegraph and Telephone Handbook
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A complete catalogue of mechanical and trade books sent upon request.

MOVING PICTURES!

Great Fun

Turn the handle, look through the slot and see the moving pictures. No end to the amusement it will furnish. Great fun showing these moving pictures to your friends. Price, 25c.

GET OUR FREE PREMIUM OFFER

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Howard & Baltimore Sts.
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Send the Coupon for this Money Saving BASCH DeLuxe Diamond Book

Special Fountain Pen Offer

Full size, 6 1-2 inches long. Lever self-filler. Guaranteed non-leakable. Your name inlaid in gold FREE. 14-k solid gold pen, iridium tip. We guarantee free repairs for 2 years. Our special factory price to you, only $1.00. Simply pin $1.00 bill to the coupon and send for this great fountain pen value TODAY.

$1

TODAY, more than ever, you should be sure to get the great money-saving 1920 Basch De Luxe Diamond Book before you think of buying a diamond. The coupon brings it to you *free*. See the truly wonderful bargains which are offered through the great buying power, expert knowledge and foresight of the great House of Basch. In spite of rising prices, in spite of the scarcity of Diamonds, Basch still offers a blue white ½ carat at $48.75; ¾ carat at $72.00 and many other equally attractive bargains. But you must get our book quickly, while these remarkable offers last. Don't delay. Send the coupon *today*. Act NOW!

Money Back Guarantee

Basch guarantees in writing to refund full cash price less 10% should you, for any reason, wish to return any diamond bought from us within a year. Also offers you full price in exchange for another diamond at any time. Carat weight, quality and value is guaranteed. "See that your diamond is Basch guaranteed."

Free Examination

Basch takes all the risk. Diamonds sent for free examination. You pay nothing until you have examined and proved to yourself that the diamond you ordered is a real bargain. Don't miss this wonderful opportunity. Act now.

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The big 1920 Basch DeLuxe Diamond Book is truly a guide to the best diamond bargains obtainable as well as rare values in jewelry, watches, etc. Don't consider buying a diamond until you see the money-saving offers of the House of Basch. Send the coupon at once. (Or post card will do.)

L. BASCH & CO. Dept. 03471 – State & Quincy Sts., Chicago

Free Coupon

L. BASCH & CO.
State and Quincy Streets
Dept. 03471 — Chicago, Ill.

Please mail me *free*, without obligation, your 1920 Basch De Luxe Diamond Book.

☐ I am enclosing $1.00. Please send me your guaranteed fountain pen with my name, as printed below, engraved in gold, free.

Name _____

Address _____

Town _____ *State* _____

This kind of Mince Pie

Was it because you were so hungry?—was it because mother put so many good things into it?—or was it just because you were so young, that mother's mince pie tasted so good?

In order to help you make up your mind, take home tonight a package of

NONE SUCH MINCE MEAT

This mince meat has all the good things in it that mother used to blend in her mince meat. It's to be had in a neat little package all ready to mix for the pie crust. And it can be made right up into a

MINCE PIE

"Like Mother Used to Make"

Do you remember what an appetite you had for Mince Pie Day in your mother's time? Mince Pie Day can be today, if you take home a package of None Such.

Merrell-Soule Company, Syracuse, N. Y.

7½%

WITH SAFETY

We have two strictly high class Corporation bonds that can be bought on a basis to yield 7½%. We have others that will yield from 5% to 6⅞%—all high grade bonds.

A request for E12 will bring descriptive circulars and a list of other securities.

Denominations, $100, $500, $1000

Partial Payment Plan when desired.

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Capital $2,000,000

CHICAGO	DES MOINES	NEW YORK
112 W. Adams St.	521 W. Walnut St.	512 Fifth Ave.

Free Book
Containing complete story of the origin and history of that wonderful instrument—the

Easy to Play Easy to Pay

[4]

SAXOPHONE

This book tells you when to use Saxophone—singly, in quartettes, in sextettes, or in regular band; how to transpose from orchestral parts and many other things you would like to know.

You can learn to play the scale in one hour's practice, and soon be playing popular airs. You can double your income, your pleasure, and your popularity. **Easy to pay** by our easy payment plan.

MAKES AN IDEAL PRESENT

Send for free Saxophone book and catalog of True-Tone Band Instruments.

BUESCHER BAND INSTRUMENT CO.
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for Xmas

—a Maxim Silencer for his rifle. Completely silences the noise. He can get lots of fun on stormy days or long winter evenings practicing indoors. FREE BOOK explains fully—get it NOW.

THE MAXIM SILENCER CO.
93 Homestead Ave., Hartford, Conn.

MAXIM SILENCER

The Day After Christmas

One gift stands out above all others—the one you use at once for good, hard play.

The Auto-Wheel

Jump on it on Christmas morning, and you'll know it's Christmas. And the next day, and on through boyhood Auto-Wheel's your most dependable friend. Always ready for fun or work. It coasts faster than others, and is easier to pull with a load.

Has real roller bearings, and the steel tires and axles make it strong and long-wearing.

Two Types

There's the **Auto-Wheel Coaster**—the old reliable—a marvel for coasting and general use. And there's the **Auto-Wheel Convertible Roadster**—two wagons in one. In a minute a box-wagon, the snappiest roadster you saw.

Put the Auto-Wheel on your Christmas list. The other fellows want it, too. Form your Auto-Wheel Coaster Club when you get your wagons. We'll send a cap for each member, and a special cap for the Captain.

FELT PENNANT FREE—Also Auto-Wheel Booklet. Just send us names of 3 local coaster dealers, telling which one handles Auto-Wheel.

Buffalo Sled Co.
137 Schenck St., N. Tonawanda, N.Y.
In Canada: Preston, Ont.

ASBESTOS

We are miners and shippers of Crude Asbestos in any quantity. We produce all grades at our world-famous BELL ASBESTOS MINES, in Canada. We also card fibres, spin yarns, weave cloths, and make all sorts of Asbestos products.

For anything you want in Asbestos, turn to

KEASBEY & MATTISON COMPANY
Dept. S-3, AMBLER, PENNA., U.S.A.
Owners of the world's largest Asbestos Mines

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30 Days Free Trial

Freight prepaid on any **"RANGER"** bicycle. **Write at once** for our *big catalog* and *special offers*. Take your choice from 44 styles, colors and sizes in the famous **"RANGER"** line. *You cannot afford to buy* without getting our *latest propositions* and **Factory-to-Rider** prices.

Easy Payments if desired, at a small advance over our special **Factory-to-Rider** cash prices.

Boys, be a **"Rider Agent"** and make big money taking orders for bicycles and supplies.

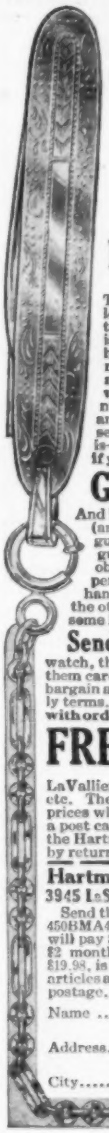
TIRES equipment, sundries and everything in the bicycle line at *half usual prices. Write today.* A post card will do.

MEAD CYCLE COMPANY Dept. T108 Chicago

$1 Brings This High Grade Watch, Chain and Knife

Here is one of the most sensational watch offers ever made. It seems incredible—yes, impossible. But we are going to bring 100,000 new customers to our great jewelry department—therefore this special limited offer. Read the description below—then send your order while the offer lasts.

Cut Shows Actual Size



Handsome Gold Filled Case

Guaranteed 10 Years

This watch is a splendid time-piece. Specially selected by our watch expert as equal in appearance to many for which you would pay much more. Case is gold filled and made in the popular plain finish, highly polished—the product of one of the world's most famous watch case makers. Absolutely guaranteed for 10 years. Imported (Swiss) movement with 7 jewels and 2 adjustments. Dial with Arabic numerals. Looks exactly like a fifty dollar watch and is a remarkably accurate timekeeper. You must see this watch outfit to realize what a big bargain it is—and you get it at our bargain price and easy terms if you act now. Read our sent-on-approval offer below.

Gold Filled Chain and Knife

And here is something extra. We send with the watch (and make no extra charge) this handsome 10 year guaranteed gold filled chain, and beautiful 10 year guaranteed gold filled knife. Chain has alternating oblong and circular links. Knife has two finely tempered steel blades and 10 year guaranteed gold filled handle, richly embossed on one side, highly polished on the other. A superb outfit, all complete, packed in handsome lined case.

Send Coupon or Letter Only $1.00 now and we ship all 3 articles—the watch, the chain and the knife. When they arrive, examine them carefully. Then if satisfied that they are a wonderful bargain and what you want, pay for them on our easy monthly terms. **Order by No. 450BMA44. Price $19.98. $1 with order. Balance $2 every 30 days until price is paid.**

FREE Jewelry Catalog Whether you order the watch, chain and knife or not be sure to get this book. Filled with bargains in watches, rings, brooches, LaVallieres, chains, cuff links, toilet sets, silverware, etc. The very choicest, most artistic designs at prices which mean money saving for you. Only a post card necessary. Just tell us to send the Hartman Jewelry Catalog and it goes by return mail—free. Send for it.

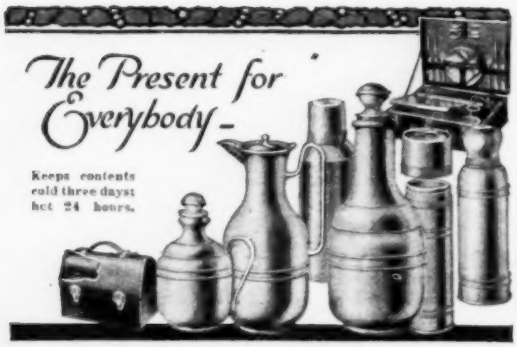
Hartman Co. (Jewelry Dept)
3945 LaSalle St., Dept. 2341 Chicago

Send the watch, chain and knife No. 450BMA44. I enclose $1 and if satisfied will pay $2 thirty days after arrival and $2 monthly thereafter until the price, $19.98, is paid. Otherwise will return the articles and you will refund the $1 and return postage.

Name .....

Address .....

City ..... State .....



GIVE AN

ICY-HOT

for CHRISTMAS

EVERYBODY needs and will enjoy the use of an Icy-Hot Bottle, Jar, Lunch Kit or Motor Restaurant. It is a suitable gift for any or all of your friends as it combines beauty and utility.

Everyone who loves life in the outdoors, who motors, travels, fishes, or hunts—finds the hot or icy cold drinks and food he can carry in his Icy-Hots delightful.

In the home Icy-Hot keeps babies' milk or invalids' broths at proper temperature, always ready for instant serving. Icy-Hot Lunch Kits are needed by all who carry lunch.

Easily cleaned—absolutely sanitary. Protected against breakage—last a lifetime. Look for name "ICY-HOT" on bottom. Ask your dealer. If he can't supply you, send his name.

Write today for Illustrated Catalog.

THE ICY-HOT BOTTLE COMPANY
218 West Second Street Cincinnati, Ohio

Save All Scrap Lead

Use all scrap lead, shavings and trimmings, by melting down into usable form in this

AMBU LEAD MOLD

Every metal shop needs them. Pays for itself in salvage in a few weeks. $1.50 Each. $2.50 Pair. Write for circular C—of other battery shop money savers.

American Bureau of Engineering
601-1601 S. Michigan Ave., Chicago

Quality First

Boston Garter

Velvet Grip

11

Here, Bill
- a Luden's will fix that throat

A clear nose and throat will make working easier. Workers in all industries use Luden's the year 'round. A protection in damp or dust.

LUDEN'S MENTHOL COUGH DROPS
GIVE QUICK RELIEF

Blue Buckle

Union Made
OverAlls

"Strong for Work"

Jobbers OverAll Company, Inc. Lynchburg, Va.

The choice of American workmen for nearly half a century—because THEY *WEAR LONGEST*—

SWEET-ORR
CLOTHES TO WORK IN

AGENTS: $12.00 a Day

2 in 1 Reversible Raincoat

Something new. Not sold in stores. Positively guaranteed waterproof. Steam vulcanized. Ideal for rough work and hard service. One side a handsome black raincoat, reverse side a fine dress coat. For business men, clerks, farmers, teamsters, truck drivers. Every man a prospect. Wolf sold 19 coats in 4 days. Binford sold 26 coats in 5 days. Easy seller. Everybody satisfied.

Big Opportunity for Women

We have all styles and sizes for men, women and children. Mrs. Jones in her spare time sold 10 coats in less than a week. Edith Remor says: "It's the easiest and best seller I ever had. I sold 3 coats to one family yesterday." Don't delay. Act quick. Be first in your community to introduce this new reversible coat and our new line of guaranteed raincoats. Send at once for our offer and sample.

THOMAS RAINCOAT CO.
448 Jane St. DAYTON, OHIO

WAXED CARBON PAPER

Will not smut, dry out or wrinkle; superior wearing and manifolding qualities; will not soil the hands or stationery; make clean, legible copies. Sold direct at factory prices; all colors in light, medium and standard weights. Send $1 for sample box of 50 sheets, legal size. State color and weight desired. Money back if not pleased. Address, **Dept. 19, THE RIBBON WORKS, Galveston, Texas**

If it hasn't this Red Woven Label

MADE FOR THE **B.V.D.** BEST RETAIL TRADE

(Trade Mark Reg. U.S. Pat. Off. and Foreign Countries)

It isn't B.V.D. *Underwear*

ENTER A BUSINESS

of your own and earn big annual income in professional fees, making and fitting a foot specialty to measure; readily learned by anyone at home in a few weeks; easy terms for training, openings everywhere with all the trade you can attend to. No capital required or goods to buy, no agency or soliciting. *Address*

STEPHENSON LABORATORY, 1 Back Bay, Boston, Mass.

GET WELL—BE YOUNG—GROW TALL

This University discovery is the most important health invention of the century. It remakes and rejuvenates the Human Body. It produces normal spines. It frees impinged and irritated nerves, corrects contracted muscles, shortened ligaments, eliminates congestion, improves circulation and drainage of the body. **It will increase the body's length.**

THE PANDICULATOR CO., 1514 Prospect Ave., Cleveland, O.

Amazing Profits In Mushrooms

Anybody can add $20 to $40 per week to their income, in spare time, entire year growing mushrooms in cellars, sheds, barns, boxes, etc. I tell you where to sell, at highest prices.

Free Illustrated Instruction Booklet

HIRAM BARTON

Dept. 2, 329 W. 48th St., New York

Typewriter Sensation

Free Trial

Use as You Pay

ONLY

$4.00

a month until the low total price of $44.35 is paid, and the machine is yours.

This is absolutely the most generous typewriter offer ever made. Do not rent a machine when you can pay $4.00 a month and own one. Cash price, $40.75. Never before has anything like this been attempted.

NATIONAL TYPEWRITERS

Direct from Factory

You will be the first one to use it. It is a personal writing machine. Weight 9¾ pounds. Is equipped with all the latest attachments and every modern operating convenience as found on latest models large 40 and 50 pound typewriters.

The National will do all the work they will do as an office machine, and at the same time has all the advantages as a **portable** traveling typewriter.

See and Try Before You Buy

Comes to you with everything complete: tools; light, strong carrying case; instruction book; ribbon; nothing extra to buy. You cannot imagine the perfection of this beautiful typewriter until you have seen it.

You Take No Risk—Put in Your Order *Now*

When the typewriter arrives deposit with the express agent $8.35 and take the machine for five days' trial. If you are convinced that it is the best typewriter you ever saw, keep it and send me $4.00 a month until our bargain price of $44.35 is paid. If you don't want it, return it to the express agent, receive your $8.35 and return the machine to me. I will pay the return express charges. This machine is guaranteed. It is standard.

The supply at this price is very limited, the price will probably be raised when my next advertisement appears, so don't delay. Fill in the coupon today—mail to me—the typewriter will be shipped promptly. There is no red tape. I employ no solicitors—no collectors—no chattel mortgage. It is simply understood that I retain title to the machine until the full $44.35 is paid. You cannot lose. It is the greatest typewriter opportunity you will ever have. **Do not send me one cent. Get the coupon in the mails today—sure.**

HARRY A. SMITH, 510, 218 N. Wells St., CHICAGO

H. A. SMITH, 510, 218 N. Wells Street, Chicago, Ill.

Ship me a National Typewriter F.O.B. Chicago, as described in this advertisement. I will pay you the $36.00 balance of the **special** $44.35 purchase price, at the rate of $4.00 per month. The title to remain in you until fully paid for. It is understood that I have five days in which to examine and try the typewriter. If I choose not to keep it I will carefully repack it and return it to the express agent. It is understood that you give the standard guarantee for one year.

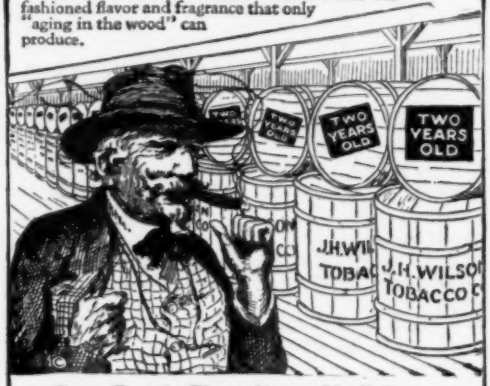
Name .....

Address .....

.....

HOME-SPUN TOBACCO

Wilson's Old Kentucky Homespun Tobacco is the cream of the finest crops Kentucky's bountiful soil can produce—ripe, rich leaves—smooth and mellow—with a rare old-fashioned flavor and fragrance that only "aging in the wood" can produce.



From Two to Three Years My Tobacco Ages in Great Oak Hogsheads

Aging as I do it, renders the tobacco as mellow as moonlight, as fragrant as the rose. Every trace of harshness leaves it—nothing to "bite" your tongue, or parch your mouth; nothing to tire your taste. Free from all adulterants that undermine the health.

Samples

10¢

Send 10c for a box of fresh samples drawn from the original **two-year aging** hogshead. I will send you **free** a full size cigar pattern and my big new book, "The Truth About Tobacco," which tells how we Kentuckians make from the pure leaf in our own homes, the smoothest smoking—the most delightful chewing twists—the finest cigars and snuff that man ever made. Tells how to get this rich, mellow **home-spun** direct from where it is grown and

Reduce Your Tobacco Bill 1/2

Profusely illustrated; cover shows a typical Kentucky tobacco plantation in natural colors. Send a dime today and enjoy the cream of Kentucky's finest tobacco. State whether chewing or smoking; Strong, Medium or Mild.

J. H. Wilson, Export Tobacconist Box 464, Mayfield, Kentucky

Send only $1

Be Your Own Dealer

Secure Wholesale Rates

Introductory Offer so you can try these famous goods by mail. Price $5.63 for the set. On receipt of $1 we send three splendid shirts and handsome silk neck-tie parcel post C. O. D. $5.63 and postage.

Six Months' Wear Guaranteed

These shirts are made of finest white percale shirting fabric with neat stripes of blue, black, and lavender. One shirt of each color to the set. Cut in the popular coat style, cuffs attached, hand laundered and very fashionable. Standard sizes 14 to 17. Choose your color of tie. Money back if not pleased. Save time, order now and

WRITE *for New Catalog* DURATEX

as good as a smart New York store, and get wholesale rates on fashionable hosiery, underwear, neckwear, soft and stiff cuff dress and sport shirts. Guaranteed for six months' wear or new garments free. You owe your pocketbook to send for it and **be your own dealer** and save dealers' profits on all you buy. It's the only real way to save.

Wearer agents make extra money in spare time.

GOODELL & CO., 554 Duratex Bldg., NEW YORK

Largest mail order wholesale haberdashery house in the world

Guaranteed 5 years

American movement, stem wind and set watch, fancy design back, wonderful timekeeper, for selling 20 large colored pictures or 20 packages post cards at 15 cents each. Order your choice.

FREE

SENT PREPAID. **GATES MFG. CO., DEPT. 579, CHICAGO**

DO YOU NEED MONEY Out of work? Got a lot of spare time? We want MEN or WOMEN in every city to do special local advertising. No experience necessary. Will not interfere with your regular work or household duties. Hundreds are now making $15 to $35 weekly. Write me for particulars. ALBERT MILLS, Mgr., 1858 American Bldg., Cincinnati, O.

Battery Shops Need

This great salvage machine doubles the life of storage battery plates by pressing composition into grids. Make your shop modern by getting an

AMBU PLATE PRESS

Made of heavy wood, with acid-resisting finish. Nothing to corrode. Price **$32.50.** Write for circular B of other battery shop money-makers.

AMERICAN BUREAU OF ENGINEERING
601-1601 S. Michigan Avenue, CHICAGO

The Electric Safety razor makes shaving a pleasure. Blade vibrating 7,200 times a minute cuts the beard smoothly and without slightest pull or irritation—feels like a gentle massage. Can be used with or without electric current.

All Users of the **Lek-Tro-Shav** Speak Well of It

A barber says—"Have shaved for years and have never used any shaving device near its equal."

A home user says—"The most pleasing shave I've ever had in my life. Shaves my face closer than I used to shave, but there is no after irritation or ill effects as I usually get from another razor."

No. 1 Made for use from Light Socket.
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Write for illustrated circular describing Lek-Tro-Shav Safety Razor fully.

AN IDEAL CHRISTMAS GIFT FOR MEN

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A powerful portable lamp, giving a 300 candle power pure white light. Just what the farmer, dairyman, stockman, etc., needs. Safe—Reliable—Economical—Absolutely Rain, Storm and Bug proof. Burns either gasoline or kerosene. Light in weight. Agents wanted. Big Profits. Write for Catalog.

ADOPTED BY THE U. S. GOVERNMENT

The Best Light Co., 324 E. 5th St., Canton, O.

Send No Money

TAILOR MADE TO YOUR ORDER ALL WORSTED

Blue Serge Pants

$1.65

$6.50 Value

WE PAY EXPRESS

Remarkable offer. Yes, we will make you a pair to order, guarantee perfect fit and send them to you **express prepaid** for only **$1.65.** Money back if not satisfied.

Nowhere Else can you find such a wonderful bargain as this. We make all suits, pants and overcoats to your individual measurements. Prices guaranteed lowest ever made for Tailor Made-to-Order Suits and Overcoats.

152 Styles Your choice of 152 of the very latest styles. Exclusive novelty features without extra charge. **Your** suit tailor-made-to-order just to make others ask where you got it. **BIG PROFITS**—Make $2,500 to $3,000 a year by our wonderful new plan, fully explained in our sensational world's most beautiful Style Book with the snappy

MOVING PICTURE TIE-UP

Gorgeous scenes in many colors showing actual scenes of some of the snappiest moving pictures ever taken. Nothing like it. Also greatest collection of woolen samples and fashion designs ever shown. A postal brings everything free—explains all. Write quick.

RELIABLE TAILORING CO., 377 S. Peoria St., Chicago

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HAVE YOUR OWN "MOVIE"

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Wonderful new system of teaching note music by mail. To first pupils in each locality we give a $20 superb Violin, Mandolin, Ukulele, Guitar, Hawaiian Guitar, Cornet, Tenor Banjo or Banjo absolutely free. Very small charge for lessons only. We guarantee success or no charge. Complete outfit free. Write now. No obligation.

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The EVINO is beautifully finished, the entire mechanism being enclosed in a compact, dull brass case. Two small screws hold it to the wall or woodwork. If you are a renter, remove the screws and take the **Evino** with you when you move.

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Why use Coal or Wood?

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The Oliver Oil-Gas Burner makes **any** cooking or heating stove a gas stove. Burns coal oil (kerosene). No coal or wood. Cooks and bakes better. Cheaper Keeps your home warmer. You regulate flame. **Fits any stove anywhere.** No fires to start, no ashes, no chopping, shoveling, poking and dragging of coal. Saves hours of work and loads of dirt. Simple. Safe. Easily put in or taken out. No damage to stove Lasts a lifetime. Thousands of delighted users. In use eight years. Money-Back Guarantee. Free literature. **Agents Wanted**

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The Oliver Oil-Gas Burner makes 2 gals. oil equal 97 lbs. coal

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Makes permanent Household and Garage repairs. Easy to apply as putty—lasting as iron. 25c and 50c per can. Write for interesting Booklet on Household Repairs.

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$1679 BUYS THE MATERIAL TO BUILD THIS HOME

Improved Sensibly. Cut-to-Fit. Approved by Carpenters. When You Build "THE HARRIS WAY" you build to stay. Exclusive cutting and bundling features—special advantages for the careful Home Builder. It is the best, safest and most sensible way to build your ideal home **right, without the waste of a single penny.**

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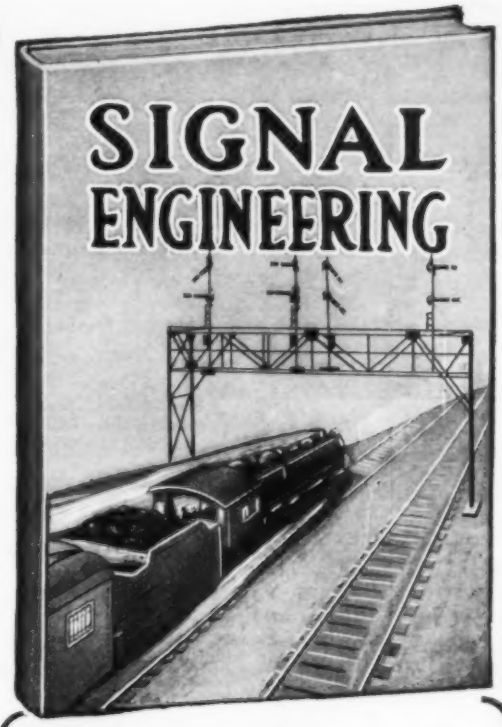

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10 Days FREE—Send No Money

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We don't ask you to pay us a cent until you have used this wonderful modern white light in your own home ten days, then you may return it at our expense if not perfectly satisfied. We want to prove to you that it makes an ordinary oil lamp look like a candle; beats electric, gasoline or acetylene. Passed by Insurance Underwriters. Children handle easily. Tests by U. S. Government and 35 leading Universities show that the new **ALADDIN**

Burns 50 Hours on One Gallon

common kerosene (coal oil), no odor, smoke or noise, simple, clean, won't explode. Over three million people already enjoying this powerful, white, steady light, nearest to sunlight. **Won Gold Medal** at Panama Exposition. Greatest invention of the age. Guaranteed.

$1000 Reward will be given to the person who shows us an oil lamp equal to the new **Aladdin** in every way (details of offer given in our circular). We want **one user in each locality** to whom we can refer customers. To that person we have a special introductory offer to make, under which one lamp is **given free.** Write quick **Yours FREE** for our 10-Day Free Trial Offer and learn how to get **one free,** all charges prepaid. **Yours FREE**

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Largest Kerosene (Coal Oil) Mantle Lamp House in the World

Men With Rigs or Autos Make

$100 to $300 Per Month

Our trial delivery plan makes it easy. No previous experience necessary. Practically every farm home and small town home will buy after trying. One farmer who had never sold anything in his life before writes: **"I sold 51 the first seven days."** Christensen, Wis., says: **"Have never seen an article that sells so easily."** Norring, Iowa, says: **"92 per cent of homes visited bought."** Phillips, Ohio, says: **"Every customer becomes a friend and booster."** Kemerling, Minn., says: **"No flowery talk necessary. Sells itself."** Thousands who are coining money endorse the **Aladdin** just as strongly.

No Money Required.

We furnish stock to get started. Sample sent prepaid for 10 days' free trial and given absolutely without cost when you become a distributor. Ask for our distributor's plan. State occupation, age, whether you have rig or auto; whether you can work spare time or steady when can start; townships most convenient for you to work in.

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10 Cents

WORTH OF COMMON ORDINARY **KEROSENE**

or **Coal Oil** will keep this lamp in operation for **50 HOURS** and will produce

No Wicks to Trim
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300 Candle Power

of the purest, whitest and best light known to science. Nothing to wear our or get out of order. Simple. Safe. Absolute satisfaction guaranteed. Send for catalog showing lamps for every purpose; also special introductory offer and agency proposition. Write today.

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Try in your own home at our risk. Gives three times the light of common lamp on half the oil. 60 candle power 50 hours on 1 gallon of kerosene. **Better, brighter, safer, cheaper** than Gas, Gasoline or electricity. Approved by Government Experts and Scientists. 500,000 satisfied users. Show the

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to parties whom we refer to you and make big profits. Write today for selling plans, exclusive free territory and introductory offer.

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BURNERS make your old kerosene lamps and lanterns give a brilliant white light better than electricity or gas. Doubles your light. Saves oil. **NO MANTLE TO BREAK.** Guaranteed Safe and Reliable. Delights every user. Send now for complete sample postpaid 50 cents, stamps or coin. 3 for $1.25. **MONEY BACK IF NOT SATISFACTORY.**

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300 CANDLE POWER OF LIGHT AT A COST OF 1/8c PER HOUR

BURNS KEROSENE OR GASOLINE

Kerosene lamps make and burn their own gas from common kerosene (coal oil) and are an achievement surpassing all other known methods of artificial lighting. Same give a bright and steady white light at a very low cost, as a 300 candle power lamp will only consume one gallon of kerosene in 62 hours. The **"QUICKLIT"** gasoline lamps CAN BE LIT WITH AN ORDINARY MATCH like city gas.

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Also get my money-saving offer on Kalamazoo Pipe and Pipeless Furnaces, Kitchen Kabinets and Tables, Phonographs, Indoor Closets, Fireless Cookers, Sewing Machines, Washing Machines, Cream Separators, Paints and Roofing. **Ask for Catalog No. 473.**

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FREE LARGE GENUINE EASTMAN

Premo Film Pack Camera, for selling 20 large colored pictures or 20 packages post cards at 15c each. Order choice today. **Sent prepaid.**

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or any watch you want. Easy payments and 30 days Free Trial. Send for **Big**

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For the "Big Four" Ro-San Sanitary Specialties for Homes Without Plumbing

Ro-San Indoor Closet Two sizes—one for farm and village homes; one for large homes, schools, factories, churches, stores, etc.

Ro-San Washstand Hot and Cold Running Water without Plumbing.

Rolling Bath Tub, With Heater A Wonderful proposition—just out—everybody eager for it.

These four specialties will make any hustler **big money.** You can fit out any home with a complete bathroom. We want live wires everywhere to represent us, either part or all of their time. Special proposition to men who can direct men and organize territory and who can carry small stock.

A real opportunity is before you. This "big four" means wealth for those who go after it—because every farm and village home wants what we have to offer. Write today.

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ESTABLISHED 1858

Select Your Christmas Gifts from Our Jewelry Catalog. Send for it Today.

Our Diamonds are distinctive in beauty, of great brilliancy, set in the latest fashionable Solid Gold Mountings.

The Best Gift of All

We Prepay Shipping Charges

We are offering wonderful values in Diamond Rings, special for Christmas presents, at $25, $50, $75, $100, $125. Credit terms, one-fifth down, balance in eight equal amounts, payable monthly. See Catalog.

Suggestions for Christmas Presents

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Loftis Solitaire Diamond Cluster Rings	100 up	Diamond Scarf Pins	8 up
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Diamond Brooches	7 up	Watches, gold filled	18 up
Diamond Ear Screws	25 up	Cameo Rings, Diamond-set	12 up
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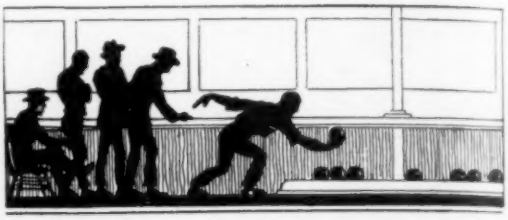
STORES IN LEADING CITIES



Wanted—Men to Run Box Ball Alleys

We want to open American Box Ball Alleys in five hundred more towns. If you're ambitious to own a business of your own, you're the man we want. We will arrange with you so that you can own the business and pay us a little at a time out of the alleys' earnings. Don't worry about the money. We will supply the equipment on our easy payment plan. Very little cash is needed. What we want is **live men.** Write today for full particulars.

$12 to $18 Per Day

You can make $12 to $18 per day for yourself. Scores of proprietors of American Box Ball Alleys are making $100 a week or more from just two alleys. C. T. Patterson, of Illinois, opened three alleys and cleaned up $800.70 the first two months. Now he operates eight alleys and out of the proceeds has built a beautiful 3-story home.

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American Box Ball becomes the rage wherever it is started. More fun than ordinary bowling. Practically 100 per cent profit. No advertising expenses—no helpers, no wages to pay. Pins are reset and balls returned automatically. Wonderful automatic electric lighted scoreboard. Write for full description and particulars of our special proposition to live men.

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OWN A MOVING PICTURE SHOW
SMALL INVESTMENT STARTS YOU
PROFESSIONAL MACHINE COMPLETE OUTFIT
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You can sell to nearby trade or travel all over the country. There is a big demand for window lettering in every town. Send for Free Samples and full particulars.

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The wonder of it—it writes all languages from Eskimo Indian to Kata Kana Japanese and over 365 different type sets—for every profession, every business, every science. Just turn the knob to change language or type.

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Also an Aluminum PORTABLE Model. 11 pounds. Full capacity. Ask for special Folder.

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"*Little Wireless Phones for the Ears*"—require no medicine but effectively replace what is lacking or defective in the natural drums. They are simple devices, which the wearer easily fits into the ears where they are invisible. Soft, safe and comfortable to wear at all times.

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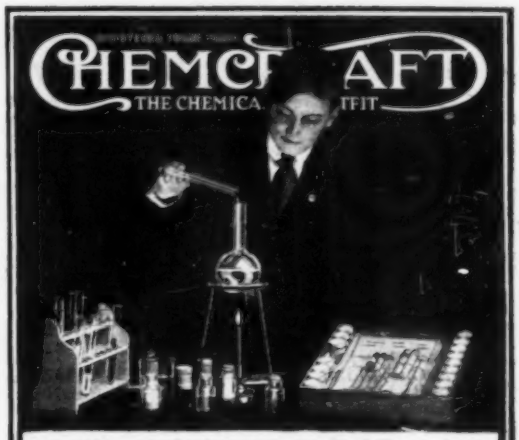

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69	HS-2-L Flying boats	$6160.00	Brooklyn, N. Y.
26	Sets spare parts for HS-2-L	1500.00	" "
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46	H-16 Flying boats	11,053.00	Philadelphia, Pa.
46	Handling trucks for H-16	300.00	" "
20	F-5-L Flying boats	12,400.00	" "
20	Handling trucks for F-5-L	300.00	" "
68	Aeromarine type 39-B seaplanes	3000.00	Gloucester, N. J.
10	Sets spare parts for 39-B seaplanes	2500.00	" "
14	Handling trucks for 39-B	75.00	" "
10	Aero Model 40 Flying boats	4000.00	Hampton Roads, Va.
1	Seaplane JN type twin engine	2000.00	Philadelphia, Pa.
1	Aeromarine type 39-A seaplane	1500.50	Gloucester, N. J.
245	Curtiss OXX-6 Engines (new)	1207.50	" "
49	Curtiss OXX-6 " (used)	$690-1035.00	" "
13	Curtiss OX-2 Engines 90 HP	1035.00	" "
3	Curtiss OX-5 " 90 HP	1035.00	" "
13	Curtiss OXX-3 Engines 100 HP	$690-1035.00	" "
2	Hall-Scott engines 100 HP	1150.00	" "
12	Gnome engines 100 HP (new)	1500.00	" "
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Appraised value of used motors depends upon number of hours flying time. Most of this equipment is new and in excellent condition; many of the planes have never been uncrated.

The above equipment is stored at the Fleet Supply Base, South Brooklyn, N. Y., Naval Aircraft Factory, Philadelphia, Pa., Naval Aircraft Storehouse, Gloucester, N. J., Naval Air Station, Hampton Roads, Va., and Naval Operating Base, Hampton Roads, Va. The notation opposite the items gives location where stored. Prices are f. o. b. point of storage.

Sales will be made subject to prior sale and approval. The quantities and appraised values are subject to change without notice.

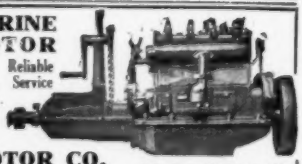
Application to purchase any of the above equipment should be made to the Salvage Section, Bureau of Supplies and Accounts, accompanied by deposit for 5 per cent of the amount bid. Effort will be made to make awards in the order in which offers are received.

Inspection is invited and may be arranged for with the Supply Officer of the above Naval Stations. Schedules of Sale giving full description and complete data as to terms of sale are obtainable from the above officers or from the Salvage Section, Bureau of Supplies and Accounts, Navy Department, Washington, D. C.

JOSEPHUS DANIELS,
Secretary of the Navy.

10/6/19.

Universal MARINE MOTOR



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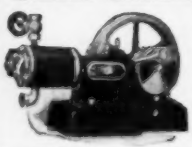

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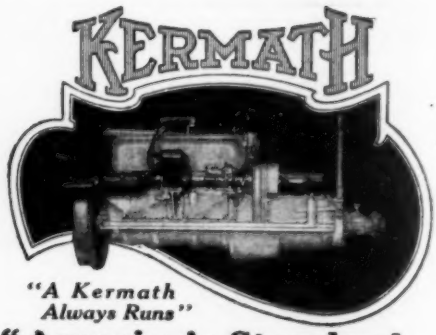

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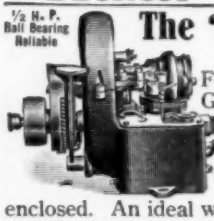

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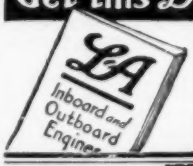

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pivots on stern of boat. Can be raised or lowered. Steers with propeller. Goes 5 to 10 miles per hour. We build our Caille Five-Speed Motor and inboard motors 2½ to 30 h.p. Send for details.
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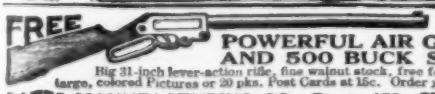

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Serve it cold

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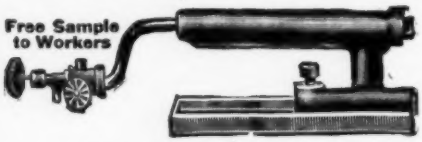
AGENTS

New Kerogas Burner
Makes Any Stove a Gas Stove

Burns Common Coal Oil (Kerosene)

Sells in Every Home



Fits Any Stove

Makes a gas range out of your old cook stove or heater. Easy to install—just shove it into the fire box. No trouble to operate or keep clean. Just supply it with fuel.

No Coal—No Dust—No Ashes
Burns Just Like Gas

Cuts down on the housework. No kindling to cut—no coal to carry—no ashes to empty. Just a clean, gas-like flame. Quickly lighted. Extinguished instantly by the turn of a valve, just like gas. Necessary winter and summer.

ABSOLUTELY SAFE

Burns Kerosene (coal oil). Can't Explode. Do away with dangerous gasoline stoves. The Kerogas is better and altogether safe. Fire prevention is better than Fire Insurance.

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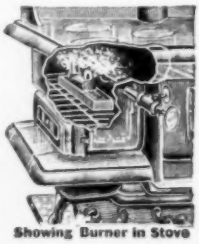
The Kerogas pays for itself in a very short time in the money it will save. Helps cut the high cost of living.



Showing Burner in Stove

Aker Averaging 8 Sales Every Day

The Kerogas is a wonderful money-maker for agents. Aker averaging 8 sales a day, says he expects to sell a dozen a day when he gets fairly started. Carleton made $17.50 in a day and a half. M. G. Emanuel writes: "It's a wonder. I'll keep you busy filling orders." "Can sell 25 Burners right here in my locality."—Roy F. Mills. W. E. Aton sold 12 first day.

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You can build up a paying business supplying the urgent demand for the

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Write for particulars.

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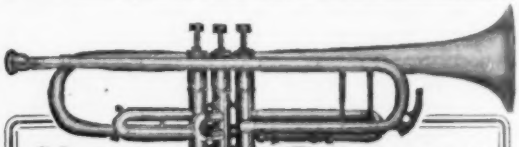

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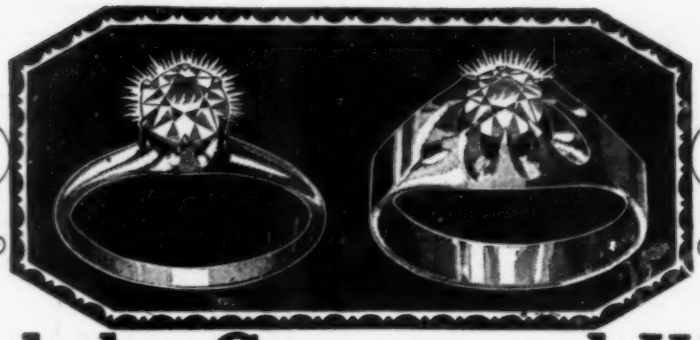

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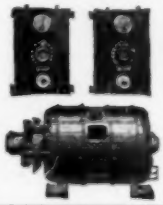

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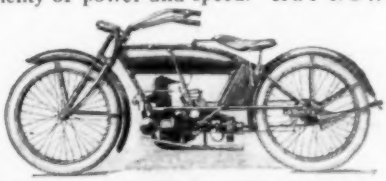

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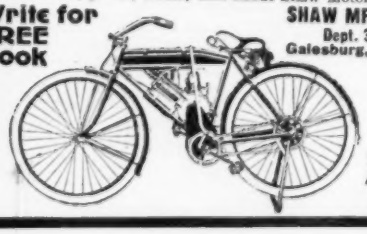

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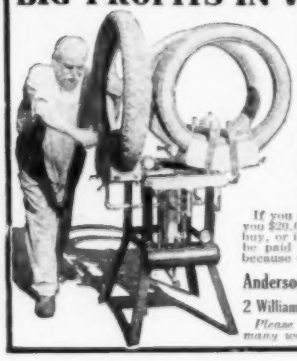
HARRY R. GEER CO., 888 McLaran Ave., St. Louis, Mo.

BIG PROFITS IN VULCANIZING



We manufacture the Anderson Vulcanizers and teach you the Famous Anderson Method of Vulcanizing in 5 to 10 days in our State School nearest to you, and guarantee to make a first-class vulcanizer out of you or refund your money. Many of our graduates make over $3,000 a year.

Visit the city of our nearest school where you can see all other makes and hear their Method of doing the work, then visit our Anderson school and get our Method. Go prepared to take five to ten days course of the Anderson Method and you will know why our graduates make good.

If you do not buy then our course costs you $20.00, and any time thereafter if you buy, or if you buy at the start, you will be paid $2.00 per day expense money, because we sell the work you do.

Anderson Steam Vulcanizer Company

2 Williams Bldg., Indianapolis, Ind., U. S. A.

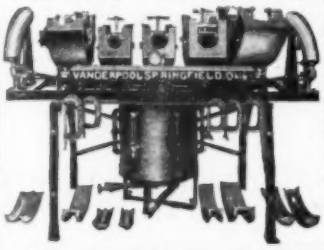
Please print your name. We receive many we cannot make out.

Men without previous experience can get into a very profitable, fast-growing business

Everyone makes money in the TIRE VULCANIZING BUSINESS. Profits 100% or more. Small investment. We are pioneers in the manufacture of the dry cure vulcanizer.

The Vanderpool Vulcanizer Outfit

Repairs tires by the correct method. The Vanderpool Principle is endorsed by the great tire factories, also by veteran repairers after trying others.



We send you FREE TIRE REPAIRING MANUAL. If others have been successful, so can you be. Write today for full particulars.

In answering address *Dept. B.19.*

Wm. Vanderpool Co., Springfield, O.

Glidden Auto Finish will make your old car look like new. Get color card from your paint dealer.

GLIDDEN

PAINTS · VARNISHES · COLORS · INSECTICIDES

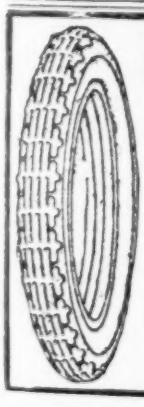
---

12 to 15 H. P. Motor, $67

with carburetor; also furnished with unisparker and magneto

Just the thing for aircraft, cyclecars, motor sleds, railroad speeders, etc. Can also be supplied with cooling fan for stationary purposes. A lightweight, high speed, high efficiency valve-in-head motor, weighing 85 lbs., which has made good in actual service. Order from this advertisement. We guarantee motor as represented. Circular "A" mailed on receipt of stamp. Assembly prints mailed on receipt of 25 cents. Parts supplied for Imp. Motorcycles and Mack Motors. Prices subject to change without notice.

Lake Motor Co., Box 630, Milwaukee, Wis.



STANDARD MAKE

USED TIRES

SAVE 75% ON YOUR TIRE BILL

Biggest Tire Bargains Ever Offered

SIZE	Used Tires	New Tubes
30 x 3	$ 4.50	$1.75
30 x 3½	5.50	1.90
32 x 3½	7.00	2.00
31 x 4	7.00	2.05
32 x 4	7.50	2.15
33 x 4	9.00	2.25
34 x 4	9.00	2.35
34 x 4½	9.25	2.60
35 x 4½	10.00	2.65
36 x 4½	10.00	2.75
35 x 5	10.50	2.85
37 x 5	11.50	2.95

ORDER NOW. Send $1.00 deposit for each tire ordered. Balance C. O. D. subject to your examination. State whether S. S. or Cl. is desired. *Discount of 5 per cent when full amount accompanies order.*

Goodway Tire Co., 1483 Michigan Avenue, Dept. P, CHICAGO, ILL.

Replace Broken Window in 10 Minutes with a "STIK-TITE"

FORD

OVERLAND

DODGE FORD

BUICK-HUDSON

HUPMOBILE

PATENTED

Anyone can stick this window on like a tube patch without tools or extra expense, without removing back curtain—without loss of car's use. It lasts longer. No metal fasteners, no stitching perforations to weaken celluloid.

Makes very neat appearance and when once attached, practically becomes part of your back curtain. Made in exact sizes for practically all popular cars.

Prices 60 cents up complete, according to size. See your dealer or write to address below.

We also furnish Tops Complete or Top Recoverings for all cars; have patterns for most popular models and can mail recovering to fit.

Protect your car with our "WARNER" Seat Covers, "Frost King" Radiator and Engine Covers. Repair with Stik-Tite Roof Patches, and Lily-White Tube Patches.

DEALERS WRITE FOR SUCCESSFUL PLAN THAT BRINGS YOU NEW CUSTOMERS AND EASY SALES.

We are experienced in handling foreign business.

The Cincinnati Auto Specialty Company

Dept. 12A 242 Main St.
Cincinnati, U. S. A.

INSTALLATION of a New Stromberg Carburetor on any car, insures prompt starting, instant acceleration, maximum speed, power and flexibility in coldest winter weather.

—and guarantees greatest of fuel economy—most miles per gallon of gasoline.

Send name, model and year of your car for complete descriptive matter—and time, trouble, money-saving facts.

Stromberg Motor Devices Co.
Dept. 1214, 64 E. 25th St.
Chicago, Ill.

New STROMBERG Does it! CARBURETOR

STANDARD Demonstrating TIRES

Size	Tires	Tubes
30x3	$ 6.50	$1.75
30x3½	7.50	1.90
32x3½	9.00	2.00
31x4	9.50	2.05
32x4	10.50	2.15
33x4	11.50	2.25
34x4	12.50	2.35
33x4½	13.50	2.50
34x4½	13.50	2.60
35x4½	14.00	2.65
36x4½	15.00	2.75
35x5	15.50	2.85
37x5	16.50	2.95

SEND NO MONEY—JUST THE COUPON

ROYAL TIRE & SUPPLY CO.
1461 Michigan Ave.
Dept. P Chicago, Ill.

Ship or Express—Parcel Post (state which) slightly used, **Demonstrating Tires and Tubes** I have checked, with privilege of examination. If satisfactory will pay C. O. D. Want S. S.—Cl.—(state which).

Name.....

Address.....

Postoffice..... **State**.....

5% allowed if full amount is sent with order.

The Seneca MOTOR CAR

Built for the Owner $1085.00

Simple, sturdy construction. Low cost of up-keep and operation. Cantilever springs in rear. **Comfortable, easy-riding.**

Dealers Wanted

Immediate deliveries. Fifth successful year. Increased output. Liberal newspaper advertising in dealers' territory. Wonderful opportunities. Write or Wire NOW

THE SENECA MOTORCAR CO., 32 Seneca Factory, FOSTORIA, OHIO

GREB RIM TOOL

Operates all types of cross-split rims

"Wallop" your rim with a hammer to force it in or out of place and you are bound to have greater trouble next time. **DO THE SENSIBLE THING:** Provide yourself with the best rim tool on the market and save time, trouble and rims.

Ten Days' Trial If your dealer or jobber does not have them, we will send you one. Try it ten days. If not satisfactory, return it to us and we will refund your money. **We also make the Greb Automatic Grip Puller.**

THE GREB CO., 193 State St., BOSTON

An Easy Way to Make Money

Don't be content to plod along on a small salary. Be independent. Go in the tire repairing business and make $60 or more a week. One man made $45 the first day he received his outfit. **Others are making $25 a day and hundreds of wide-awake men are making $200 to $500 a month.** No experience needed. We teach you how. Very little capital required. But slight risk, as every car owner in your town is a possible customer. Jobs are plentiful because tires blow out and puncture every day.

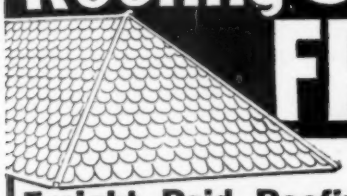
SHALER Tire Repair Outfit, $70

will do as much and as perfect work as the big $250 to $500 vulcanizing outfits. A boy can vulcanize perfectly with this simple machine. It's the only vulcanizer that has **Automatic Heat Control.** It must vulcanize just right. It can't undercure or overcure a tire. Requires no watching or regulating. You can learn to do expert tire vulcanizing in half an hour with the Shaler.

WRITE FOR FREE BOOK **"HOW TO OPEN A TIRE REPAIR SHOP"** and complete Catalog, which gives full information. WRITE QUICK BEFORE SOME HUSTLER GETS AHEAD OF YOU.

C. A. SHALER CO., 2011 Fourth Street, WAUPUN, WIS.

Roofing Book FREE



Get Our Freight Paid Roofing Prices

Don't buy Roofing of any kind until you get our big Free Roofing Book, describing full line of Edwards Famous "Tightcote" Galvanized Roofings, Sidings and Ceilings, and our lowest freight-paid prices. Then see for yourself how much we save you by selling direct and saving you all in-between dealers' profits.

EDWARDS "REO" Metal Shingles

Absolutely rust proof. By our patented "Tightcote" process, edges as well as sides of metal sheets are heavily coated with zinc—not a space the size of a pin point exposed to weather. Fire and lightning proof. Outlasts three ordinary roofs. Forever wind and weather proof. Need no repairs—end all roofing expense. Patent INTERLOCKING DEVICE makes water tight seams—all nail heads covered—no chance for rust or leaks.

EDWARDS Galvanizing Test

Edwards "Tightcote" Galvanized Roofing can be bent, twisted or struck by lightning, and the galvanizing will not crack or flake. Bend it or hammer it—you can't loosen or scale the galvanizing. No other galvanized roofing can withstand this test.

Low Priced Garages

Wide variety of styles, all sizes of Portable Fireproof Metal Garages. Lowest prices ever made. Postal brings Big Garage Catalog **free.**

Write Today for free samples and proof that we can save you a lot of money on any kind of roofing siding or ceiling you may need. Ask for Roofing Book No. 1250.

THE EDWARDS MFG. CO.,
1200-1250 Pike St., Cincinnati, O.

TIRES ¼ LESS

PRE-WAR PRICES! Save Big Money on Fresh, New Tires. Plain and Non-Skid. **No Seconds.**

GUARANTEED 7500 MILES WILL RUN 10,000

We pay the war tax.

TIRES FREE Secure agency proposition and get your tires FREE. Write today for Free Book and Agency Offer.

WALTER DAVID RUBBER CO. 308 Pershing Road KANSAS CITY, MO.

Tire Agent

We want one exclusive representative in each locality to use and sell the new Mellinger Extra-Ply, hand made tires. **Guarantee Bond for 8000 Miles.** (No seconds.) Shipped prepaid on approval. Sample sections furnished. Do not buy until you get our Special Direct Prices. Write

MELLINGER TIRE & RUBBER CO., 946 Oak St., Kansas City, Mo.

STANDARD TIRES LESS THAN HALF PRICE

Send No Money. Pay Only on Arrival — Examine and Judge for Yourself

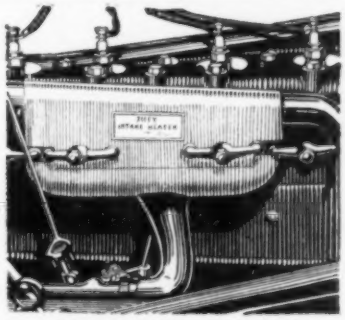
Standard make used tires in first class condition, selected for us by an expert. They can be readily guaranteed for 4,000 miles. **We rebuild standard make used tires into dependable long mileage tire bargains.** And your money back if you don't like them. Do not confuse these tires with double tread or the so-called slightly used and demonstrating tires.

Size	Tires	Tubes	Size	Tires	Tubes	Size	Tires	Tubes
30x3	$ 7.75	$2.25	32x4	$11.90	$3.45	34x4½	$14.75	$4.45
30x3½	8.75	2.45	33x4	12.90	3.65	35x4½	14.90	4.35
31x3½	9.50	2.85	34x4	13.70	3.75	36x4½	15.00	4.60
32x3½	9.75	2.70	36x4	16.90	4.55	37x4½	16.50	4.70
31x4	10.50	3.25	32x4½	13.25	4.15	35x5	17.90	4.75
			33x4½	14.25	4.35	37x5	17.90	4.90

State Make Desired. If We Have It We Will Ship It

We guarantee satisfaction. If not satisfied upon examination, goods may be returned to us at our expense. In ordering specify straight side or clincher, nonskid or plain.

Cleveland Tire Co. 3112 Michigan Avenue, CHICAGO, ILL.



Jiffy Manifold Heater for Ford Cars Only $1.00 Postpaid

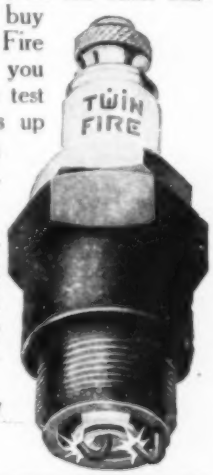
The investment of $1.00 in a Jiffy Intake Manifold Heater pays big returns—not only in greater mileage per gallon of gas, but in greater comfort and easier starting. Big production makes the low price possible. Many car manufacturers are equipping their engines with manifold heaters knowing that greater efficiency results. You yourself can bolt the Jiffy on your Ford engine in five minutes, no adjustments to be made, nothing to get out of order. Send along a dollar, and by return mail we will ship your Jiffy on an absolute guarantee that if you are not entirely satisfied you can return it and get your money back. Remember—it saves from 25c to $1.00 every time the gas tank is filled.

TWIN FIRE

We also make the well-known Twin Fire Spark Plug—the only plug of its kind. Fires two distinct sparks, and if one point fouls the other continues to fire. Before you buy another plug investigate Twin Fire—ask your dealer to show you the "lead pencil" test—the test that shows up the truth in spark plugs.

Ordinary plug is dead when even one point fouls.

Twin Fire always fires. Short one point and the other still fires. One point cleans the other.



Dealers:

Get details of our dealer proposition on both the Jiffy Intake Manifold Heater (retails for $1.00) and Twin Fire Spark Plug—two successful accessories.

Twin Fire Spark Plug Company
724 Grand River Ave.
DETROIT, MICHIGAN

Radiator and Engine Covers

Prepare now to save gas, make starting easy, and prevent engine trouble by ordering your "Frost King" before the cold weather demand makes them hard to get.

The Frost King is the **only** cover constructed on absolutely scientific principles and was designed by one of the best insulating engineers in the country.

Frost King Covers are made in three grades. All have three-ply construction. All have a heavy **Asbestos** center. All are tailored to fit smartly. Yet the prices with the asbestos included are very little more than you must pay for the ordinary kind.

The Black Diamond quality Frost King has an exceptional covering fabric that will not crack or peel, and the inside felt lining acts like the softest polishing cloth to keep the finish on the hood in fine condition.

The De Luxe quality Frost King has extra special quality artificial leather covering in colors to match your car.

Don't delay seeing your dealer. Write us if he can't supply you.

Dealers look ahead! Hundreds of thousands of new cars sold this summer will **all speak at once** for covers **on the first cold day.** Are you going to be ready with a full stock for the most popular cars, and for a **Big Clean-Up** on that day?

Car Owners and Dealers

We have added the Warner Seat Cover business to our line of Stik-Tite Windows, Auto Tops, Top Recoverings. We maintain the highest standard in fabrics and tailoring. You'll find Stik-Tite Lily-White self-vulcanizing tube patches more satisfactory than vulcanizing.

Our Stik-Tite Windows provide the quick and easy way to replace your broken back window without removing curtain. For all popular cars. Prices 60 cents up.

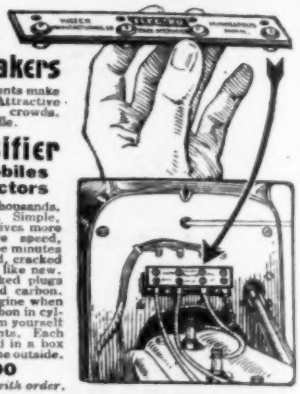
We are experienced in handling export business in all our lines. Write for prices, free catalogs and samples.

The Cincinnati Auto Specialty Company

Dept. 12B, 342 Main St., Cincinnati, Ohio

Please Mention Popular Mechanics

Quick Action



For Money Makers

Regular $3.50 specialty. Agents make 300% to 1,000% profit. Attractive to demonstrate and gets crowds. Small, light and easy to handle.

Spark Intensifier

for Ford Automobiles and Fordson Tractors

Sensational value. Selling thousands. Every Ford should have one. Simple, powerful, safe attachment gives more power, more "pep," more speed, saves gas. Easily on in three minutes—no holes to bore. Makes old, cracked or worn spark plugs work like new. Demonstration shows cracked plugs fire through grease, oil and carbon. Makes it easy to start engine when cold in winter. Reduces carbon in cylinders. Saves Gas. Sell them yourself or appoint your own agents. Each Intensifier is neatly packed in a box with price $3.50 printed on the outside.

Sample, $2.00

Send money order or cash with order.

KIEFER MANUFACTURING COMPANY
406 Palace Bldg. MINNEAPOLIS, MINN.

Here is the best auto warning signal you can buy. Attaches to engine in place of priming cup.

EXPLOSION WHISTLE Guaranteed to give 10 years of satisfactory service. Made in single tone and chime.

Send for particulars.

BUELL MANUFACTURING COMPANY
2983-85 Cottage Grove Ave. CHICAGO

35 Miles per hour

Is Record of this Car.

Get 1920 Plans. Ready Now.

Boys, Build This Car. This nifty little car driven by gasoline motor, can be built by any boy. Parts are furnished by us and are very cheap. Send 25c for building plans & price list of parts showing how to build this last car.

SYPHER MFG. CO.
146 Warren Street
TOLEDO, OHIO

GET THIS BATTERY CHARGER

It will keep your automobile battery in fine condition and prolong its life 1 to 3 years.

$15.00

F. F. Bantum Battery Booster connected to any lamp socket will charge any 6 volt battery from 100 to 130 volts—60 cycle A. C. Current. Use it in your own garage. Cold weather lowers battery efficiency. Keep your battery in condition by systematic charging. Shipped complete with Ammeter and clips $15.00. Weighs only 15 lbs. Send check for express shipment and for parcel post include postage charges and insurance with remittance. Circular 24 gives full information and describes full line of larger sizes for both A. C. and D. C. Current.

Franco Manufacturing Company, Cleveland, Ohio

INSYDE TYRES Inner Armor for Auto Tires. Double mileage, prevent blowouts and punctures. Easily applied in any tire. Thousands sold. Details free. Agents wanted. **Amer. Accessories Co., Dept. PD Cincinnati**

Akron-Williams

TIRE REPAIR EQUIPMENT

Turns out perfect work the first time. No more "second time" jobs. Saves money, material and time. Perfected on the experience gained in equipping thousands of tire factories and tire repair businesses. *Write for catalogue.*

THE WILLIAMS FOUNDRY & MACHINE CO.

Everything for the Tire Builder and Repair Man **AKRON, OHIO**

3¢ Worth of Miracle Motor-Gas Equals a Gallon of Gasoline

AGENTS WANTED! Remarkable money-maker. Exclusive territory. 800 per cent PROFIT! New, scientific, chemical discovery increases mileage 15 per cent to 40 per cent. Prevents carbon. Makes engine run smoother. SAVES GAS. Chemists' reports prove it harmless. **Guaranteed.** O. V. Darling, Ind., made $210.00 profit in 4 hours. Dave Isom, Idaho, made $60.00 profit in one day. You can, too. Write for agency proposition

C. A. BUTLER CO. 185 Wayne Bldg. TOLEDO, OHIO

More and Better VULCANIZING

will be demanded in the coming year

Motorists are beginning to appreciate what can be done with proper vulcanizing. They will demand more of it from now on, but to hold their business it will have to be done **right.**

Those who are going into the vulcanizing business as well as those who now have shops, should investigate without delay the equipment that has revolutionized the industry and placed it on a reliable and highly profitable basis.

The Dri-Kure Retreder

It is the only vulcanizing method on the market that is fundamentally **right** all the way through. The battery of Retreders at the left is shown rapidly turning out finished tires which will require no expensive working over—and which will be turned over to the owner guaranteed with the assurance that there will be no "comebacks" on account of deficient workmanship. As is generally the way with every successful product our name, trade mark and product are being widely imitated. For your protection as well as ours, we suggest writing for a catalog on the **real** Dri-Kure Retreder at once.

Western Vulcanizer Mfg. Co.

Manufacturers of Dri-Kure Retreders, Sectional Molds, Buffing Machines and other Vulcanizing Equipment

Dept. N **150 North Desplaines Street** **CHICAGO**

You Can Save $50.00

By recovering your old auto top frame yourself. We make these recovers to fit all makes and models of cars. Any person that can drive a car can put it on. We furnish instructions. Roof and quarters sewed together with rear curtain, fasteners, welts and tacks. All complete. Give us the name, year and model number of your car and we will send you our catalogue with samples and quote you exact price.

$6.84 and up Parcels Post Paid

LIBERTY TOP & TIRE CO., Dept. E7, Cincinnati, O.

The Liberty Plane Radiator Ornament

The most popular Radiator Ornament ever produced. Fits any car, indestructible, solid aluminum, highly polished, wings hand-painted with flying emblem in Red, White and Blue. The slightest motion spins Propeller arm, and makes it seem alive. "It fairly hums with Patriotism." Postpaid $1.00; get the Agency.

DEFENDER AUTO LOCK COMPANY
500 Marquette Bldg. Detroit, Michigan

NEED AUTO PARTS?

A Million Parts a Year Pass Through Our Great Shops. Immense Variety Always on Hand.

We Are the Original

"We Tear 'Em Up and Sell the Pieces"

Over 100 Makes and 300 Models on Hand

Save 50% to 80% on Replacements

Send for Latest Prices!

Every Part GUARANTEED or Money Refunded. Write for What You Need.

AUTO WRECKING COMPANY, Dept. P, KANSAS CITY, MO.

The Original—"We Tear 'Em Up and Sell the Pieces."

Firestone Motorcycle Tires

Leading motorcycle makers furnish Firestone Tire equipment without extra cost to you. They are willing to pay the Firestone price in order that you may get full service from their machines.

Essenkay THE TIRE FILLER — Prevents Tire Troubles

No punctures or blowouts. Essenkay is not a Liquid. Doubles tire mileage. No tubes, spare tires, pumps. Over 75,000 satisfied users. Write for Free Trial Offer and Free Book. "The Story of Essenkay."

ESSENKAY PRODUCTS CO., 68-220 W. Superior, Chicago

Delivered TO YOU FREE

Your choice of **44 styles**, color and sizes in the famous line of **"RANGER"** bicycles, shown in full color in the big new Free Catalog. We pay all the freight charges from Chicago to your town.

30 Days Free Trial allowed on the bicycle you select, actual riding test in your own town. Do not buy until you get our *great new trial offer.* **EASY PAYMENTS** if desired, at a small advance over our special **Factory-to-Rider** cash prices.

TIRES LAMPS, HORNS, pedals, single wheels and repair parts for all makes of bicycles at half usual prices. No one else can offer you such values and such terms.

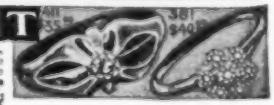
SEND NO MONEY but write today for the big new Catalog. **It's free.**

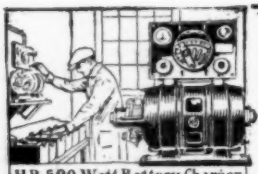
Rider Agents Wanted

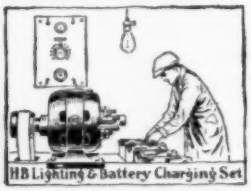
MEAD CYCLE COMPANY Dept. T108 Chicago

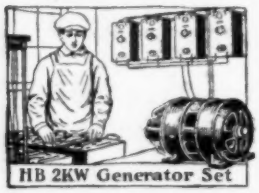
DIAMONDS, WATCHES ON CREDIT

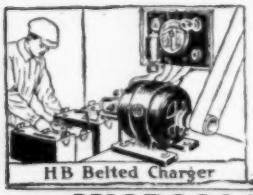
YOU SHOULD HAVE THE JAMES BERGMAN 160 PAGE JEWELRY BOOK IN YOUR HOME. Over 4,000 Illustrations, Diamonds, Watches, Jewelry, Toilet Articles, etc. Select any article desired, have it sent to you, all charges prepaid. If satisfactory, send one-fifth of purchase price and keep it, balance in eight monthly amounts. No interest charged. No security required. **Write Today** for Big Free Catalog No. 5. It tells about Our Low Prices and binding guarantee. **JAMES BERGMAN 37 - 39 MAIDEN LANE,** Estd. 1896, **NEW YORK CITY**




HB 500 Watt Battery Charger


HB Lighting & Battery Charging Set


HB 2KW Generator Set


HB Belted Charger

HB Battery Charging Pays Big Profits

You Can Make $100 to $350 Extra Profit Every Month

Charging automobile batteries is your BIG OPPORTUNITY to build a permanent, money-making business. Every car owner is a prospective customer for battery charging. It costs only 10c to 15c each to charge batteries—customer pays 75c to $1.50. *Figure that profit!* No electrical or mechanical knowledge required to install or operate an HB Charger. No burnouts, no expensive renewals, nothing to wear out or break. Only attention needed is occasional oiling. Steady, dependable service 24 hours a day, with BIG PROFITS.

An HB Charger for Every Size Battery Business

CHOOSE THE TYPE YOU NEED:

HB 500 Watt Charger

Recharges 1 to 8 6-volt batteries at once. Uses power from lines now in your garage or shop. Ideal equipment for small battery business. Should pay $100 to $200 profit a month. Runs day and night for months with practically no attention.

HB Lighting and Charging Set

Makes brilliant electric lights and charges batteries at same time. Saves money and makes money for you. Operates from line shaft or belting. Splendid outfit for garage not having electric current.

HB 32-Battery Charger

Recharges 1 to 32 6-volt batteries, or equivalent in 12- or 24-volt batteries, at one time. Four separate, complete charging panels. Should make $200 to $350 profit a month. Some users make up to $450 a month.

HB Belted Charger

Used only where electric current is not available. Charges 1 to 7 batteries at once. Operates from line shaft or belt. Sturdy, dependable, economical, pays big profits. Furnished complete with switchboard, ready to operate.

Small Cash Payment Puts Any HB Charger in Your Garage or Shop—Balance on Easy Monthly Terms

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Millions Billions in use to-day

NO PASTE NEEDED

Use them to mount all kodak pictures, post cards, clippings in albums

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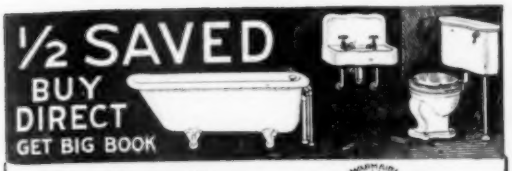

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When Johnny has the Croup!

That's a cough with a croupy rattle, so hurry for the Musterole and rub it in right over the chest and neck. How it will tingle at first and then grow ever so cool. And how it will reach in and penetrate right to the spot! It will dissipate all the stuffy congestion which causes that hacking cough.

Why ***shouldn't*** grandmother swear by Musterole for colds and coughs? It is better than a mustard plaster—good as ***that*** was in the old days. And the explanation is this:

Musterole is made of oil of mustard and other home simples. It penetrates under the skin, down to the part. Here it generates its own heat, and this heat disperses the congestion. Yet Musterole will not blister. Musterole, on the contrary, feels delightfully cool a few seconds after you apply it.

Try Musterole for Bobby and Helen and Dorothy's croup—and for your own cough, too. Try it for rheumatism—it's a regular router out of all congestions. Always keep a jar handy.

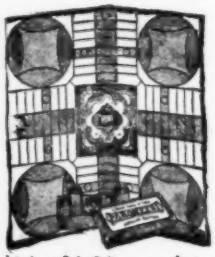
Many doctors and nurses recommend Musterole. 30c and 60c jars. $2.50 hospital size.

The Musterole Co., Cleveland, Ohio

Better Than a Mustard Plaster

MUSTEROLE
WILL NOT BLISTER
REG. U. S. PAT. OFF.

GAMES FOR CHRISTMAS



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A game that will never grow old. Remember how you used to hold a block so long and you were nearly all the way round when you were sent home? The same thrill is still there. You had better get a game and teach the youngsters how to play.

Price $1.00 complete

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Instruction and play at the same time for the young ones. A durable beautifully enameled board, 9½x13½ inches long. Letters cannot be lost or broken like blocks, etc. Will amuse youngsters for hours. **Price $1.00 complete.**

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Fun for the whole family. Not a toy, but a practical table game. 3½x5 ft. Complete set pool balls numbered, triangle frame, 4 cues; 36 inches long. Compares favorably with much more expensive ones. **Price $12.00 complete.**

For Sale by Toy and Department Stores or sent postpaid by

SELCHOW & RIGHTER CO., 620 Broadway, New York

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BRINGS YOU THESE TWO FINE SHIRTS

The latest thing in a semi-dress shirt—everybody's wearing them for business, work, and sport. They're easily worth $4 each—try to match them in any store at that price! Our price for the two is only $5.75—at least $2 saved.

CADILLAC BROADCLOTH FLANNEL SHIRTS

Made of fine quality, long wearing Cadillac Broadcloth Gray Flannel. Special Winter weight. Coat free style, cut extra full. Two extra large button-down-flap pockets, faced sleeves and matched pearl buttons. Double-stitched throughout. Soft turn-down attached collar with sateen faced neckband. Goods thoroughly shrunk.

Send Only $1.00 Write today, enclosing only $1.00. Shirts will be sent at once, transportation prepaid. Pay balance of $4.75 on arrival—no more. We will return your money at once if you are not entirely satisfied. Be sure to state neckband size.

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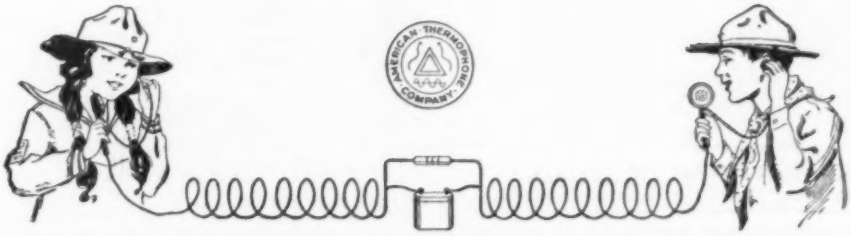

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Ingenious! Instructive! Fascinating!

An All Year 'Round Christmas Present

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Dept. A

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Own a "Junior Scout" Monoplane. A scientific flying toy unequaled. Flies in a big circle assuming a horizontal position at all times, the propeller turning rapidly. Dips and dives at will. A real toy for a real boy. Sample, 50c postpaid, 3 for $1.00. Coin or Money Order. No Stamps.

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are the result of scientific construction applied to home building. You can save money by the Sterling System because it eliminates waste, cost of handling, and the old "hand-saw methods". Send 10c today for the 1920 Book De Luxe and see for yourself the tremendous savings of the Sterling System.

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AIR RIFLE

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You control the shooting force as you desire. Look at this block of hardwood. It shows how Benjamin power is regulated as you wish. No other air-rifle can duplicate this feat.

You can't have accidents with a Benjamin. It's **safe, always,** because you control the power. The Benjamin never loses shooting force, and has no springs to get out of order or shake your aim. **Write us for an interesting folder about the most wonderful air-gun in the world.**

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Ask your dealer for demonstration.

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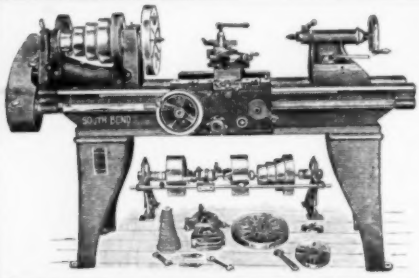
Pacific Coast Representatives: McDonald & Luderth, Call Bldg., San Francisco



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For the Machine and Repair Shops

13" Lathe	$325.00	18" Lathe	$ 700.00
15" "	420.00	21" "	900.00
16" "	500.00	24" "	1250.00

Made with straight or gap bed. Price includes equipment as shown in illustration. **South Bend Lathes have been on the market thirteen years. Over 21,000 in use.** EST. 1906.

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A tight joint is a tribute to clean-cut threads. You will find well-fitting joints on every job that OSTER BULL-DOG Die-Stocks tackle. No. 102, shown here, threads six pipe sizes, ¼, ⅜, ½, ¾, 1 and 1¼ inches.

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Gap or Straight Bed.
Medium Priced Good
Lathes for 30 Years.

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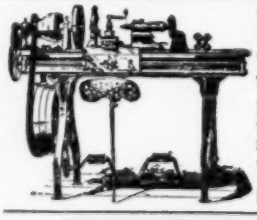
Swing 4 in., 11 in. between centers. 17 in. total length. Shipping weight 13 lbs. Bed of lathe is machined. Workmanship first-class. Equipped with wood turning chuck. Can be fitted with 3 in. face plate and drill chuck as special equipment. Order one today. Price $5.00 cash with order. **SYPHER MFG. CO., DEPT. D TOLEDO, OHIO**



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COMPLETE

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Longer bed $1 per additional foot.

Head has 3-speed cone. Spindle, No. 1 Morse taper shank centers. ⅝ hole through spindle—3½" face plate furnished. Tail stock has screw feed spindle and No. 1 Morse taper shank center. Spur center for wood turning. Adjustable rest.

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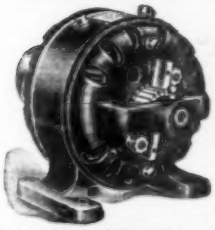
Only $5.00



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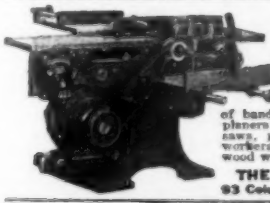

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Every Pilliod tool case is guaranteed to give satisfaction or money refunded. Catalogue Free. DEALER WANTED in every town. Write for particulars.

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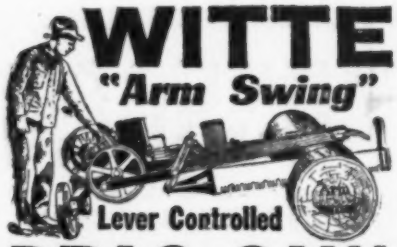

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For use on 110 volt, A. C. 60 cycle, single phase current only

60 watts, 6 volts, 10 amperes	$48.50
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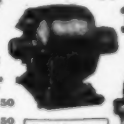
All outfits complete with switchboard as cut above.



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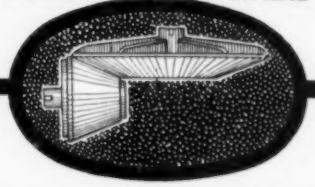
ROCKWOOD

Friction Transmission



Best for Your Machines!

Rockwood Friction Transmission is truly an economical drive. It operates with constant, high efficiency—transmits power with least loss—cuts out noise, and gives the machine on which it is used an unlimited speed range.

Able to start instantly, accelerate with great speed, and to stop suddenly. No stripping of gears. No jerking in starting or stopping.

With all these advantages, Rockwood Friction Transmission costs less than toothed gears to install and maintain.

It is standard equipment on thousands of constant and variable speed machines—saving power and upkeep cost. What it is doing for others it can do for you. Investigate Rockwood Friction Transmission today.

92-Page Book Free

Send today for this big, valuable book, "Friction Transmission." Full of helpful data.

THE ROCKWOOD MFG. CO.
1946 English Avenue, Indianapolis, U.S.A.

MANNING *Speed-grits*

Reg. U.S. Pat. Office

QUALITY ABRASIVES that are entering American factories everywhere. Write for booklet telling many curious facts about them. Manning Abrasive Co., Inc., Troy, N.Y.

ToolCases for Toolmakers and Machinists

Keep your tools orderly arranged in a Gerstner Portable Tool Case. There's a place for every tool in one of the felt lined drawers. Every up-to-date mechanic needs one and you'll find our Cases the best built, neatest and most practical on the market. We guarantee to please or refund all money. Write for our free booklet!

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Mfrs. of Mechanics' High Grade Tool Cases
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25 Cords a Day

Easily Sawed by One Man

Easy to move from cut to cut. Make big profits cutting wood. Cheap and easy to operate.

OTTAWA LOG SAW

Does 10 men's work at one-tenth the cost. Makes work easy. Engine can also be used for running pumps and other machinery.

Saw blade easily removed. Write for our low price. 10-Year Guarantee.

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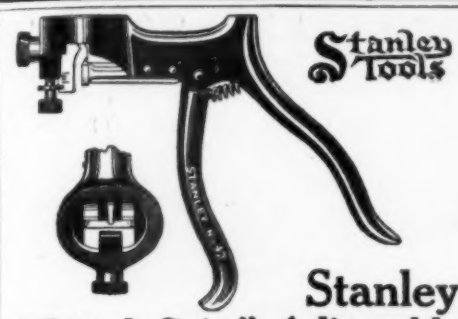
30-Day Trial



Stanley "Pistol Grip" Adjustable Saw Set No. 42

This Saw Set embodies several unique and important features not heretofore seen in tools of this description.

The shape of the Body and Handle enables the user to operate the tool with great ease and with the least possible exertion, and the saw is held firmly against the gauge while the tooth is being set.

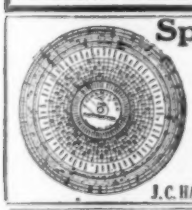
It can be readily adjusted by means of the knurled thumb screw to give a greater or less set to the teeth of the saw, according as the saw is to be used for coarse or fine work. As the anvil or part against which the plunger works is graduated, the same adjustment can be easily obtained for duplicate work.

The tool is so designed that the saw teeth are in plain view which enables the user to quickly adjust the tool to the tooth to be set.

The plunger and anvil are made of tool steel—hardened and tempered. All parts are carefully **machined** and are **interchangeable.** The tool is given a fine black finish.

ADDRESS

STANLEY RULE & LEVEL CO.
NEW BRITAIN, CONN. U.S.A.



Special Kon-Ver-Ter Slide Rule

The original KON-VER-TER SLIDE rule has over 8000 graduations and over 1800 letters and figures, will handle anything in arithmetic, Algebra, Geometry or Trig. Is 5.4 inches in diameter and in use all over the world, is much simpler to operate than others of similar construction. Eventually you will get the KON-VER-TER—get it now and save money. Plain utility rules $1.00, Special DeLuxe WHITE ivory celluloid $2.50. Leatherette cases $0.50 extra.

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Here is one exclusive point

The ONLY Interlocking, sliding rule made

"Interlox"

MASTER SLIDE RULE

Here is the Exact INSIDE Measurement

Best, quickest, most accurate rule for **outside** measurements, too.

If not at dealer's, send his name and 20c per foot (any length, 2 to 8 ft.), and we'll send rule prepaid.

MASTER RULE MFG. CO., INC.
(Formerly Dahl Mfg. Co.) 841-43 E. 136th St., New York City
Liberal Proposition for Dealers and Agents

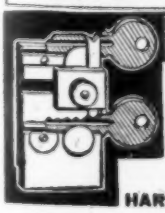
Here is the Other

SARGENT

LOCKS and HARDWARE

Solid Quality

SARGENT & CO., New Haven, Conn.



Duplicate Keys

for all Yale and similar Locks made in one minute with Harrison M. I. P. Key Filing Machine. No misfits. Thousands in use. $5.00 net. Special diamond-shaped files for angular cut keys, 60c each. Harrison C. K. Key Clamp duplicates all common and lever keys without a caliper. Price, $2.00. Parcel post prepaid.

Money returned if not satisfactory.

HARRISON & CO., 81 New St., New York

Your Success

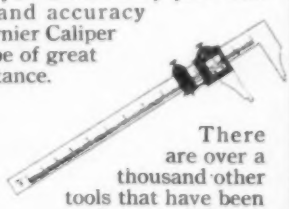
depends not only on your technical equipment but on your every day working equipment.

Your tool kit should contain enough tools to meet your every day requirements so that you can work accurately and quickly, these two points are the basis for promotion in practically every shop.

A well made reliable micrometer is an actual necessity. Its uses are unlimited. It should be in every kit.

Another practical tool is the combination square. In laying out a drill job or squaring up a piece it is of great help.

If you have many jobs that demand accuracy a Vernier Caliper will be of great assistance.



There are over a thousand other tools that have been made to aid the machinists listed in our No. 27 Catalog. *Send for it.*

Brown & Sharpe Mfg. Co.
PROVIDENCE, R. I., U. S. A.

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SEND NO MONEY

UNREDEEMED DIAMONDS

In New Solid Gold and Platinum Mountings

AT BARGAIN PRICES

Seven Genuine Diamonds in Beautiful Cluster. Looks like 2½ Ct. Stone. Unpaid Loan Price $75

SEND NO MONEY We've been lending money on High Grade Diamonds, Watches and other jewelry for over 33 years right here in Kansas City. Loans are made at a margin that enables us to sell the unredeemed Diamonds, etc., to dealers cheaper than wholesale. So, we can sell YOU unredeemed diamonds and other jewelry at a fraction of the price you'd have to pay elsewhere.

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New Book Free Just send your name today for our De Luxe Book, "The Better Way to Buy Diamonds," It will save you 40% to 66⅔% on Diamonds, Watches, and Jewelry. **Write NOW!**

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New UTILITY Chest

Quartered Oak or Leather Covered, designed for auto mechanics, garage and home use, masons, electricians, mechanics, plumbers, fishermen, painters, repairmen, linemen, piano tuners. Kiln-dried. Frame joints *lock-cornered.* Tray with movable partitions that *automatically* raise when chest is opened. **Special Lock**—*twelve key change.*

Ask for Catalog prices, and name of dealer. Sold on "Satisfaction or Money-Back" Guarantee.

UNION TOOL CHESTS

Union Tool Chest Co., Inc. 22 Mill St., ROCHESTER, N. Y.

WIRE

electrical, rope, airplane, piano, pipe-organ, flat, hoops, bale-ties, tacks, nails, barbed-wire, concrete re-inforcement, springs, netting, wire fences, steel posts, trolley-road wires and rail bonds, wire wheels, auto-towing cables, horse-shoes.

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A Blast Without a Blower

The Lane Burner brings cherry red for hardening in one-third time required by Bunsen. Pays for itself in day's use. Adopted by all advanced shops. Necessity where quick, intense heat is needed. Invaluable for hardening, soldering, brazing, annealing, tempering, melting; experimental laboratory, research work. Butterfly Valve regulates heat from moderate to blast of more than 2000 degrees. Shut-off Valve. Ever Ready Pilot, gas connector that stays connected. Tight gas tank, fixed combustion chamber. **Descriptive circular and prices on request.**

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Famous Lane Burners 21 Vose Ave., SOUTH ORANGE, N. J.

MYERS WONDERFUL SEWING AWL

Tools in Handle

A complete repair shop in itself. Sews anything heavy or light, leather, shoes, harness, buggy tops, canvas, belts, etc. **$1.00 Postpaid.**

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9 CORDS IN 10 HOURS

By **ONE MAN**

It's KING OF THE WOODS. Saves money and backache. Send for **FREE** catalog No. B115, showing low price and latest improvements. First order gets agency.

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will instantly add, subtract, multiply, divide, solve proportion, give any root or power Logarithms, Sines, Tangents, Cosines and Cotangents. Made of Metal. Size 4". It is accurate and durable and will give years of service. Price with 16 page Instruction Book, $1.00. Your money back if you are not satisfied. Before buying a slide rule of any kind, send for our catalogue. It describes all kinds. Prices from 50c to $10. Instructions in Logarithms and Trigonometry free with every Catalogue.

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THE WORLD FAMOUS

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We are now able to supply these wonderful instruments for terrestrial and astronomical observations. Cut shows new type 3" portable terrestrial. Light weight—compact—easily carried anywhere—highest quality throughout. *Circular and prices on request.*

THE ALVAN CLARK & SONS CORP.
Makers of the famous "Yerkes" and "Lick" Telescopes
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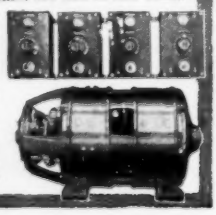
Battery Charging Your Biggest Money-Maker

$150 to $350 Clear Profit a Month with this HB-32 Battery Charger

You can recharge 32 6-volt auto batteries, or equivalent in 12- or 24-volt batteries, at one time, for 10c to 15c each. Customer pays 75c to $1.50. Figure the profits yourself. Others are making BIG PROFITS with HB Battery Charging. Why not YOU? Get busy NOW—add those extra profits to your income.



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Balance on easy monthly terms. Outfit easily pays for itself. Absolute Money-Back Guarantee. No burn-outs or renewals. Easy to install and operate. Only attention needed is occasional oiling. Write TODAY for full information.

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is soothing to your stump—strong, cool, neat, light. Easy payments. Braces for all deformities.

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BARTLETT DROP-FORGED Compound Lever **SNIPS $2 to $6**

Made of high-grade Crucible Tool Steel, accurately tempered. Cuts metal up to 18 gauge easily. 7 inch size just right for household use. 7-inch, stamped, **$2.00**
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Your dealer has them or can get them from his jobber. If he will not we will ship prepaid in U. S. at above prices.

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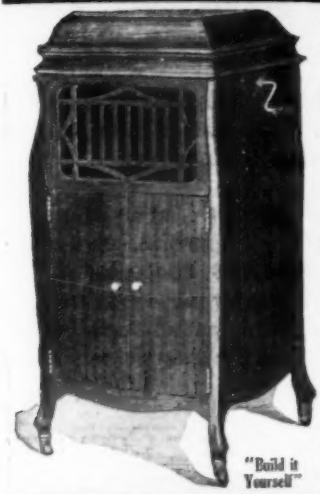
BARTLETT MFG. CO., 20 E. Lafayette Ave., Detroit, Mich.

YOU can BUILD this PHONOGRAPH *easily!*

TREMENDOUS SAVING IN COST



"Build it Yourself"

You don't need to be a cabinet maker. We have made it an easy and a pleasant job with

Our Simplified Plans We furnish blue prints, diagrams, motor, ready-built horn, cabinet pieces and all metal parts complete. You do the assembling, **6 models to choose from.** A few hours' work, and you will have as fine a type of phonograph as any produced, and at a price away below what you would pay in a store.

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Machines play all records, have a wonderful tonal quality, excelled by none. No need now for any family to be without a phonograph because of the cost. THE MAKAFONE solves the problem. BUILD IT YOURSELF AT LESS THAN ONE-FOURTH REGULAR COST, but equal to the high priced cabinet machines. Free Records with each outfit. SEND TODAY FOR FREE CATALOG and full particulars of our wonderful offer. *Many a manufacturer got his start in this way. Why not you? Build machines and sell to your friends. Ask us about this.*

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Men with no previous drilling experience write us they clear $25 to $75 a day with **Armstrong Drills — drilling water and oil wells.** Drillers everywhere are months behind their orders! It's a chance of a lifetime. Farmers, engineers, threshermen — men in all walks of life — are grasping this remarkable chance to get into this big paying business. Get started at once.

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drill more hole at less cost than any machine on the market. The ARMSTRONG—built for service since 1867—furnished in traction or non-traction style — operated by our famous special kerosene drilling engine.

The **Armstrong Drill** is a marvel of simplicity, efficiency and durability. 3 right hand levers complete every operation. Many beginners average 50 ft. per day. On hard tests it has averaged 92 ft. per day through solid rock, using only 6½ gals. fuel—figure the profit possibilities out for yourself. Get full information. Special consideration to men returning from Service.

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Write right now for Free Book.

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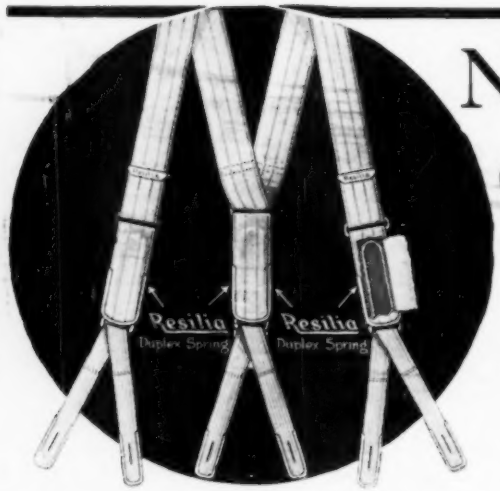

Neither wear, perspiration nor weather conditions affect the elasticity of

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Resilia NO RUBBER SUSPENDER

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RESILIA FABRIC is high-grade, closely woven and contains no rubber. The metal fittings are of special composition that will not rust or tarnish.

THE COMFORT OF RESILIA is a revelation, elasticity being in three responsive, ever-active RESILIA DUPLEX SPRINGS concealed in the webbing that give with every move you make—that work smoothly and freely at all times—under all conditions—that eliminate shoulder strain and safeguard buttons.

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IF YOUR DEALER DOES NOT SELL RESILIA, send us his name and $1.00, money order or check, and a pair will be forwarded by prepaid mail. Wear 30 days—then if not fully satisfied, return to us and money will be refunded. Please state whether 36 or 39 inch length is desired.

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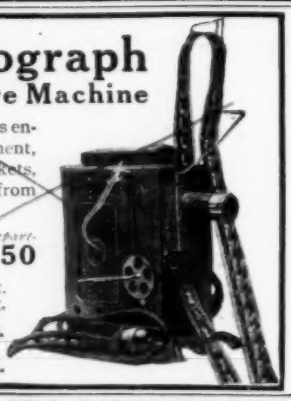
Moving Picture Machine

With three standard films enclosed in can. Film, cement, brush, and admission tickets, all complete. Operated from electric socket.

For sale by leading toy and department stores or sent prepaid on receipt of **$7.50**

All metal throughout. Heavy base casting.



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A Necessity for Every Shop

"The Samson No. 3 Bench Punch," with a powerful leverage of 24 to 1, is intended for work beyond the capacity of the **"Samson Hand Punches,"** and will punch holes from 1/8 to 3/8 in. in soft metal up to 12 Gauge. Extra sets punches and dies size 1/4, 5/16, 3/8, 7/16, and 3/8 in. easily inserted and removed, (maximum punching capacity 7/16" through 12 gauge soft metal.)

Equipped with 3-16-inch Punch and Die unless Otherwise Specified

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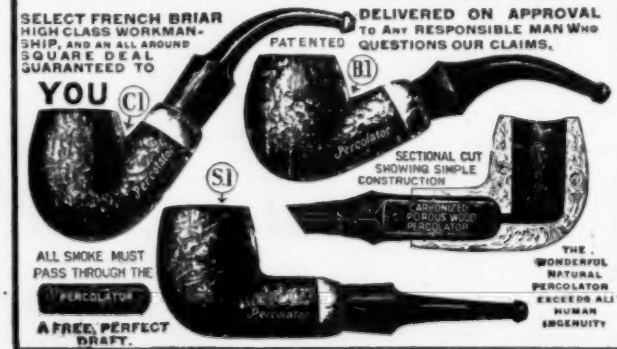
SELECT FRENCH BRIAR HIGH CLASS WORKMANSHIP, AND AN ALL AROUND SQUARE DEAL GUARANTEED TO YOU

DELIVERED ON APPROVAL TO ANY RESPONSIBLE MAN WHO QUESTIONS OUR CLAIMS.



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ALL PERCOLATOR PIPE BOWLS are ELECTRICALLY CARBONIZED Which means that they are Fully 90% "Broken In" and Positively **GUARANTEED** Against Burning Through. Full Particulars Given in Illustrated Pamphlet Forwarded upon Request. THE MODELS SHOWN Herewith Represent Three very desirable "Happy Medium" Size, Shape and Weight Pipes, of **GENUINE FRENCH BRIAR:** Solid Rubber Stem; Sterling Silver Band, Rich friction Finish; Length 5 in. Wt., 1¾ to 1½ ozs. Price $2.50 each including Box of 10 Carbonized Percolators, Postpaid In the U. S. 25c Additional for Foreign Registry.

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IT'S EASY WITH OUR HELP

Get Our FREE Blue Print Offer

DEALERS WANTED FOR OUR Ready Built Phonographs

A few hours' interesting work saves many dollars—gives you a fine machine exactly to suit your ideals—better than many machines costing much more. Plays any record.

We furnish complete, simple plans and diagrams—anyone can understand them—motors, tone arms, case material, everything required, and full instructions.

F. C. Strong, Canada, says: "Please send me one of your circulars, 'How to Build Your Own Phonograph,' as I would like to make one. Mr. Gallie has built one and if he hadn't told me that he had made it himself I would have taken it for a $150 model."

Listen to this from Charles F. Mancke, Wash.: "Received the two outfits, and am well pleased. I built one machine for myself and took an order for one for $175. I now have mine done, and it has a wonderful tone. I would not take $200 for it."

We are the originators of the home building idea. Our customers always succeed because our plans and system are easy and clear. No special skill necessary.

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Make Big Money Building Phonographs

Ask for Our Sure-Fire Plan and Free Blue Print Offer

You can make hundreds of dollars easily. Ask us. We tell you how and help you. We have started many others. We can start you. Pleasant, easy work. N. J. Adams, Michigan, says: "Just sold my phonograph which I built from your plans and parts at nearly $100 profit. Only took about a week working evenings to build it. Those who have heard it say that it is better than phonographs they have seen and heard at $200."

Become a Home Dealer — Wonderful Plan

Our dealers' proposition on our ready built Phonograph will appeal to you. It's the best thing yet. No canvassing—no work—no capital needed. It works every time. We give you full particulars and show you how to make sure, easy money.

Remember, we are the old reliable house-originators of the home building and home dealers idea. Write today. Get our proposition. Have a fine phonograph at half price and make money besides.

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Health? Take Turkish Bath at Home—Only 2 Cents

Physicians are abandoning drugs for this new treatment. If your mind or body is tired, open your pores and feel the rapid change in your condition, at cost of 2c a bath. **The Robinson Bath Cabinet** is the only scientifically constructed bath cabinet ever made for the home. **Great $2 Book Sent Free**—"The Philosophy of Health and Beauty." **Write today. Agents Wanted.**

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Cost less than leather, wear 3 to 6 times longer, are lighter, easier, stronger. Stop big shoe bills. Eliminate repair bills. Stop foot troubles. Prevent Colds, Rheumatism, Corns, Bunions. Keep feet warm and dry in snow, rain, mud, slush. Never change shape—comfortable always. **FREE Shoe Book Tells All. Write Today**

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on rebuilt at the factory by the well-known "Young Process." Sold for low cash installment or rented. Rental applies on purchase price. Write for full details and guarantee. Free trial.

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GENUINE DIAMONDS

½ CARAT PURE WHITE $33

Wonderful value in Ladies' or Men's 14k solid gold ring. Positively genuine diamond. Looks like $100 stone because of large spread. Remarkable color—brilliant, snappy. Accurately cut. Price astonishingly low. Biggest bargain you have ever seen. **Your money refunded if you can duplicate our offer at double our price.** Written legal guarantee covers weight, quality and value. ***Order from this ad***—You run no risk—everything exactly as represented. **You can wear any of our diamonds a year and return it and get your money back.** Sent on approval if desired. Absolute satisfaction guaranteed—always. 40 years' honorable dealings back up our statements. Order now—diamonds are a good, **safe investment**—constantly advancing—10% to 20% increase expected soon. Save money—**Order today!** ***Send for bargain catalog***—Full of surprises. Thousands of diamonds, rings, watches and other jewelry offers at most remarkable cut prices. Get it—**It's free.**

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Gives 50% More Mileage

Seals punctures instantly. Stops slow leaks. Preserves rubber. Keeps tires fully inflated. Thousands of users in 40 countries for 7 years.

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Last Big Block
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THIS announces the offering of the last big block of the Canadian Pacific Reserved Farm Lands. Until this block is disposed of you can secure at low cost a farm home in Western Canada that will make you rich and independent. Never again on the American Continent will farm lands be offered at prices so low.

Last Big Opportunity

This block contains both fertile, open prairie and rich park lands in Lloydminster and Battleford Districts of Central Alberta and Saskatchewan. Farm Lands on the rich prairies of Manitoba, Saskatchewan and Alberta are $11 to $30 an acre. Lands in Southern Alberta under an irrigation system of unfailing water from $50 an acre up.

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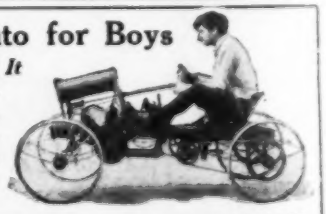

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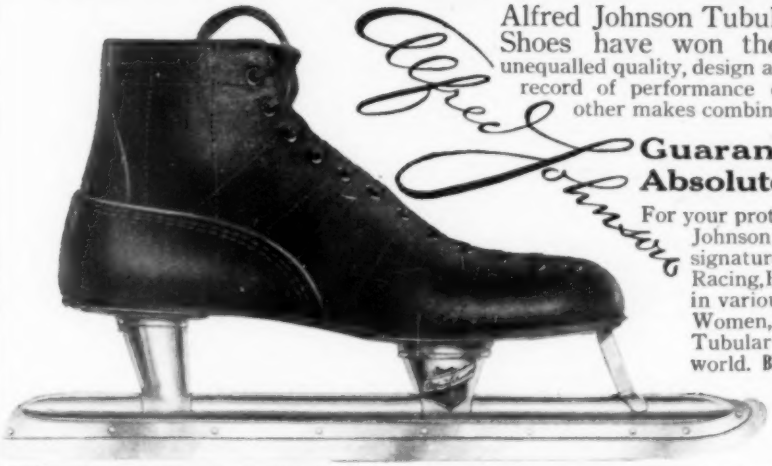

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Only one pair to a customer. Made of extra quality genuine gunmetal, calfskin vamp, dull calfskin top, blucher style, on our newest Fifth Avenue last. Combines comfort, style, quality. **Sure to give excellent wear.** Has genuine solid oak leather sewed soles and heels and is reinforced throughout. Sizes 5 to 11. Width Medium, Wide and Extra Wide. Pay $4.95 on arrival. Send today or you may be too late, for the supply at this price is limited. Use coupon now.

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Sounds a clear, musical warning—easily heard at any distance. Does not startle or offend. The pathway of your car is instantly cleared by the warning of

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Endurance, tone, workmanship and quality of Aermore Horns are absolutely guaranteed.

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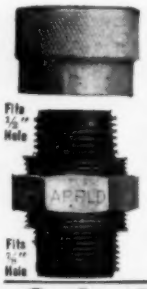

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The Duplex Compression Tester fits either ½" or ¾" spark plug holes. Used with Schrader or Twitchell Tire Gage. Turning engine over by hand registers compression on gage; reveals the cause of troubles ordinarily detected only by tearing down engine. Tells if valves need regrinding; pistons or gaskets leak. Parkerized rust-proof steel. Fills big need. Sent postpaid for $1.00. Mention jobber's name if dealer; dealer's name if owner.

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30x3½....	6.45	1.75	34x4½....	9.95	3.00
31x3½....	6.70	1.85	35x4½....	10.95	3.15
32x3½....	6.95	2.00	36x4½....	11.45	3.40
31x4	7.95	2.25	35x5	12.45	3.50
32x4	8.20	2.40	36x5	12.70	3.65
33x4	8.45	2.50	37x5	13.20	3.75

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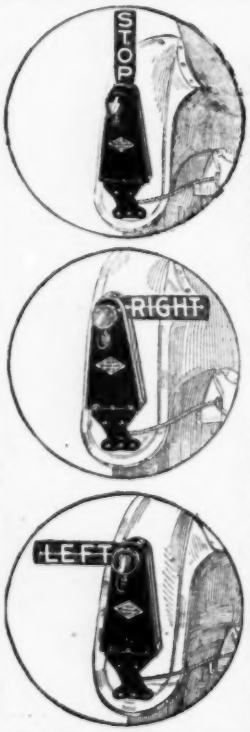

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Address .....

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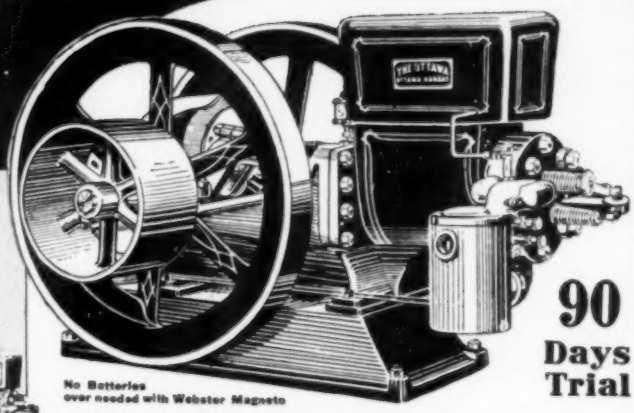
Big Reduction on OTTAWA ENGINES



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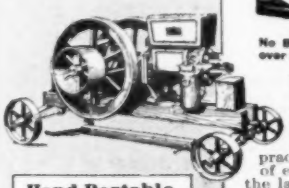

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Easy Starting—No Cranking—Fuel Saving

All materials are costing me more today than ever before and yet I have reduced my prices to practically pre-war level, by increasing the number of engines I build, thus making my engine factory the largest in the world selling exclusively direct to the user. When I lowered my manufacturing cost, I reduced my prices, and I give **YOU** the saving. I am no profiteer.

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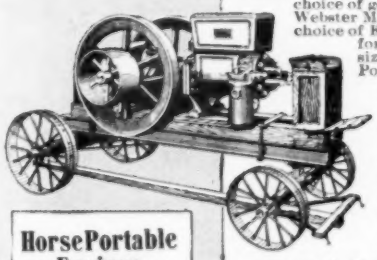

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Easy Payment Plan It is now easier to own an Ottawa Engine than to be without one. With my new easy term plan of payment—the most liberal ever made—the engine can pay for itself while you use it. You get the same engine whether you send cash or take a year to pay.

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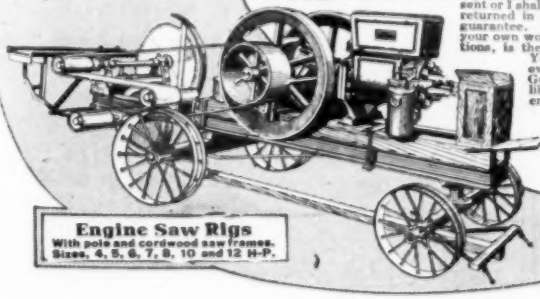

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With pole and cordwood saw frames.
Sizes, 4, 5, 6, 7, 8, 10 and 12 H-P.

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You are passing up a great opportunity if you do not use the coupon below to get my latest special offer. It will mean money to you for years to come. I will include FREE, the latest "Why" Book. It contains articles by nearly one thousand men from every state in the union. My catalogue will also be sent you free, so send in the coupon below NOW.

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About 10 acres, with abundant orange and grapefruit orchard in bearing, and large live oaks, bays, palmettos, etc. The house is new, has never been occupied, and contains 22 rooms, of which 11 are bed rooms, 2 large sun parlors, 2 large sleeping porches. Also 7 large bath rooms, 150-ft. veranda, water-softening plant, steam heat, etc. Living room is 20 by 47 ft.; dining room is 20 by 31 ft. Dock with deep water in front of house.

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1½	Good Perfection, light brown	298
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1¼	Blue Wesselton, good perfection	325
1.18	Fiery Brilliant, commercial white	288
1.06	Steel Blue White, absolutely perfect	475
1	Steel Blue White, imperfect	135
1	Eye-perfect top light brown	199
7/8	Blue Wesselton, eye-perfect	388
7/8	Exquisite Blue-Brown, eye-perfect	215
3/4	Steel Blue, slightly imperfect	250
3/4	Jager's Violet Blue, eye-perfect	299
3/4	Eye-perfect top light brown	144
5/8	Blue Rivers, very fine quality	200
5/8	Blue Wesselton, slight imperfection	133
5/8	Blue White, carbon imperfections	67
1/2	Jager's Violet Blue, absol. perfect	199
1/2	Blue Wesselton, eye-perfect	166
1/2	Steel Blue, very slight imperfection	125
1/2	Blue White, carbon imperfect	75
3/8	Jager's Violet Blue, eye-perfect	129
3/8	Blue Wesselton, very fine quality	99
1/3	Eye-perfect crystal white	75
1/4	Jager's Steel Blue, eye-perfect	89
1/4	Blue Wesselton, very slight imper.	69
1/6	Jager's Violet Blue, eye-perfect	15
1/6	Blue White, imperfect	9

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1	Steel Blue Diamond, 14k ring	$ 50
2	¾ carat Blue Wesselton Diamond	100
3	⅝ carat Steel Blue Diamond	150
4	1 carat Top Light Brown Diamond	200
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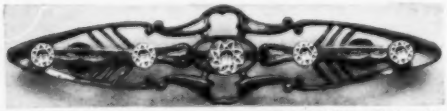

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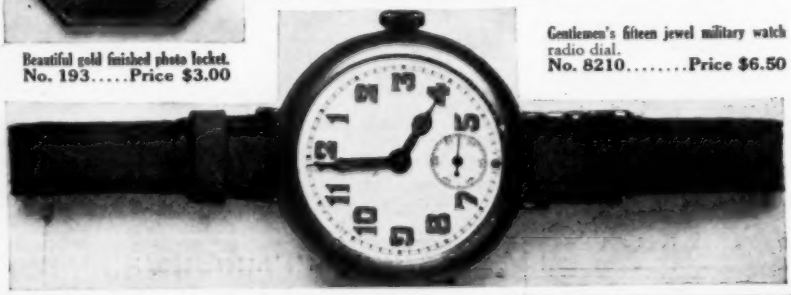

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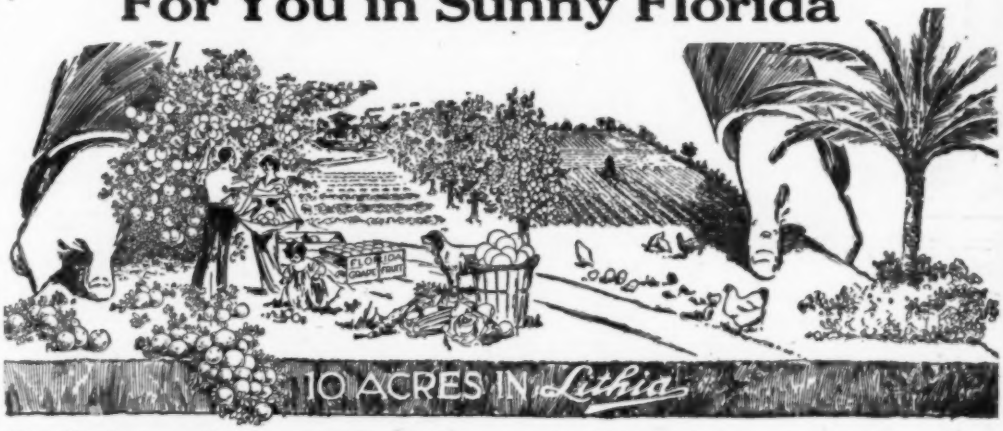

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Perfection Egg Cups

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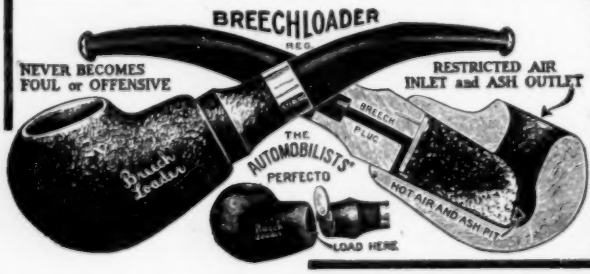

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SIOUX
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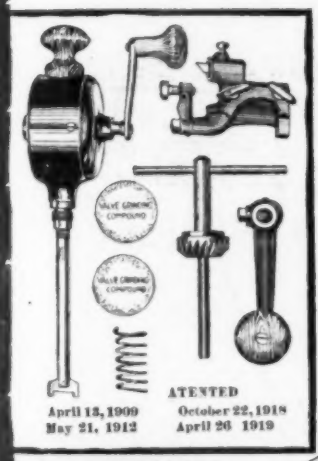

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Eliminate 80% of your engine trouble caused by carbon and leaky valves. Keep your motor young, right and snappy—hitting on all four. Stop that ruinous carbon knock. Get all the power from your motor—stop that leaking that eats up the gasoline. Grind your own valves, easily and quickly and save money. Why wait until the garage can do the job and lay up the car for several days when you can do the work in an hour as good as any one can do it. One job saves the cost of the tools and the future jobs are money saved.

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ORDER NOW If your hardware dealer or garage don't sell the "Little Sioux" Ford tool set order direct. Use coupon below. Do the work yourself and you'll enjoy it—keep your engine right, save repair bills, gasoline and time. **PRICE $7.75**

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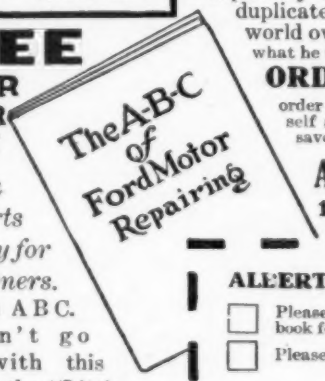

Written by experts especially for Ford owners. Simple as A B C. You can't go wrong with this book, and the "Little Sioux" Ford Tool Set. Makes Ford motor repairing a picnic.

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Put cross (X) in square opposite item wanted.

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Ask your dealer to show you the "Red Devil" line of mechanics' tools.

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Pliers	Screw Drivers
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With No Effort

When you step up to the wash basin with your hands covered with dirt, grease, paint or metal stains, just rub in a little SKAT Hand Soap and out rolls the dirt. Skat gets right into the pores and leaves the skin soft and white—no matter how tender.

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SKAT HAND SOAP

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ORDER TODAY

We Help UmakeM Members Make UmakeM Money

UmakeM Members

Enjoy all UmakeM benefits. Such as license to sell UmakeM toys. We will assist if you desire to start UmakeM Novelty making at home. Check below the outfits wanted and mail us your order today.

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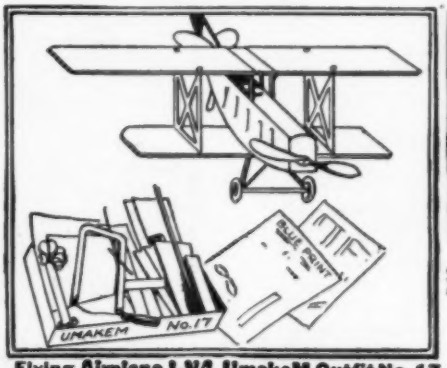
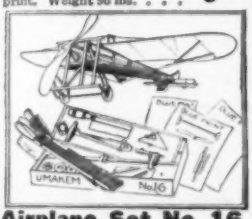
45 inches long, 18 inches wide. Complete material for making this sturdy bench including blue print. Weight 96 lbs. . . . **$9.00**

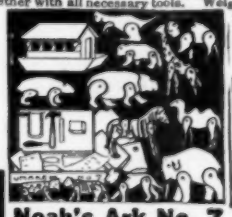


Flying Airplane J-N4, UmakeM Outfit No. 17
containing all wood, coverings, aluminum, steel wire, Para rubber, fittings, blue prints and full instructions, together with all necessary tools. Weight 2½ lbs. . . . **$3.00**

60-Piece Set No. 3
containing high quality tools, designs, 3 ply wood, hardware, colors, and everything needed to make items shown. Weight 7 lbs. **$2.00**



Airplane Set No. 16
A Workchest containing work table, mitre cutting board, gauge, drill, steel hammer, Model Maker's steel square, wood and all fittings for building one Bleriot Model Flying Monoplane. Full set blue prints and directions. Weight 10 lbs. **$10**



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contains tools and all materials with instructions and designs to make this 28 in. Noah's Ark and 24 animals (2 of each). Weight 20 lbs. . **$5.00**

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This set contains 3 ply wood, designs and hardware for making this beautiful sewing stand. Weight 23 lbs. . . . **$2.00**

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Containing 11 tools, designs, colors, special wood, complete material and instructions for making a $20.00 circus set as shown, consisting of Circus Wagon, Animal Wagon and 19 Jointed Wild and Domestic Animals. Weight 22 lbs. **$10**

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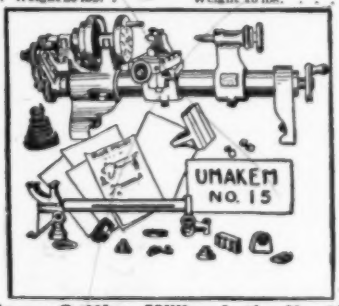
Boxed outfit contains Steel Saw Frame, Blades, Awl, Water Colors, set of Design Sheets, 3 ply Wood, pins and washers, and complete material for making 12 jointed Wild Animals. Weight 5 lbs. . . . **$2.00**
Set No. 5 similar but material makes 7 domestic animals. Weight 3 lbs. . **$1.00**



Screw Cutting, Milling Lathe No. 15
Screw Cutting, Milling Lathe can be made complete from the above outfit No. 15, which includes all castings and blue prints. Size 2 ft. 11 in. x 8 in. Wt. 100 lbs. **$25**

Toy Set No. 6
This outfit contains tools, all raw materials and fittings for making one set of above toys worth $6.00. To make more toys all you need is more raw materials. Wgt. 7 lbs. **$3.00**

Design Sheets, 10c each

No. 2 to 8 shown in No. 3 Set.
No. 9 Action Toy Village Blacksmith.
No. 112A to 112D shown in No. 4 Set.
No. 111A–111B, Domestic Animals.
No. 1A Clown on Kicking Donkey.
No. 10 Doll Furniture Set.
No. 109, 103, 123 shown in No. 6 Set.

Blueprints, 25c each

No. 140 Large Model War Tank.
No. 128 Circus Wagons shown in No. 8.
No. 135 Ark shown in No. 7.
No. 205 Work bench shown No. 205.
No. 208, 3 prints each 25c Airplane No. 16.
No. 209, 2 prints each 25c for J. N. 4 Plane.

Doll's House No. 9
Outfit contains tools, designs and all materials to make this $15.00 Doll's House. 24 in. high. Weight 25 lbs. **$5.00**

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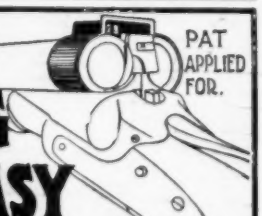

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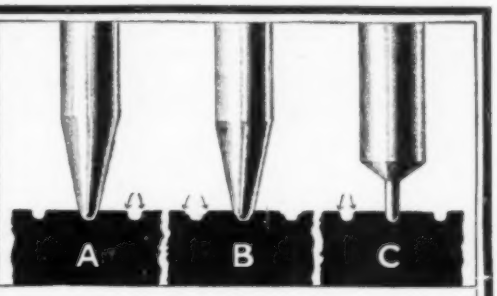

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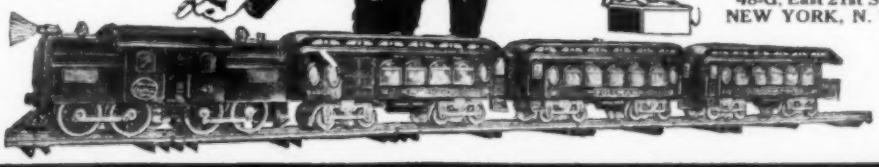

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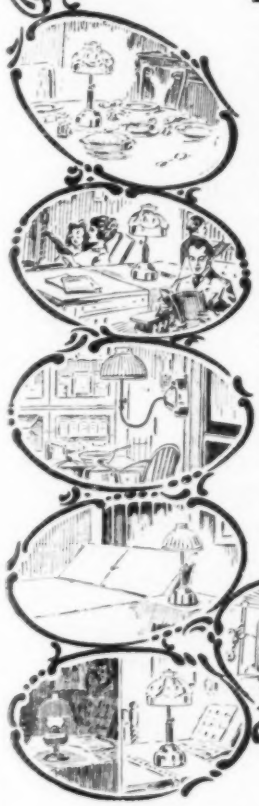

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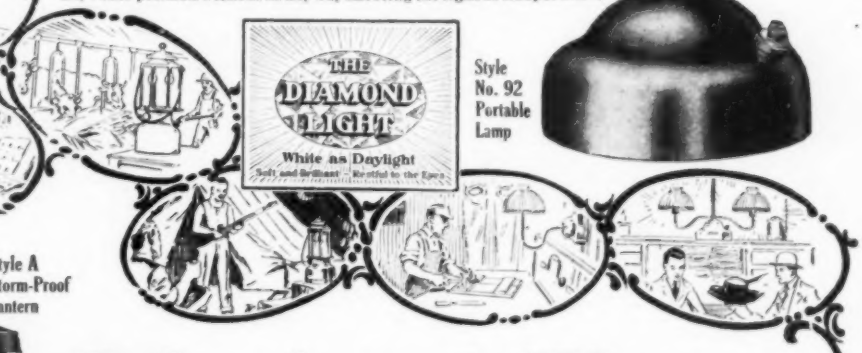
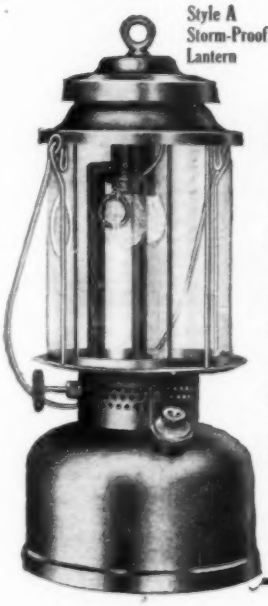


Style A Storm-Proof Lantern



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Not a Vibrator

Don't confuse the VIOLETTA with Vibrating Machines. It is not a Vibrator. It does not contract the muscles or shock the nerves. Its magic rays pass completely through the body, producing "cellular massage," known to be far more beneficial than muscular massage. It leaves no soreness after use—only delightful, agreeable relief.

VIOLETTA

Violet Ray Machine

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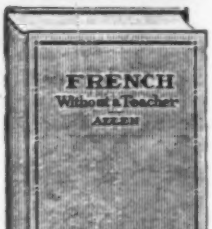

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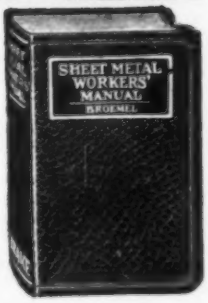

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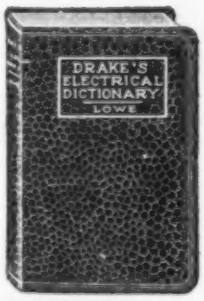

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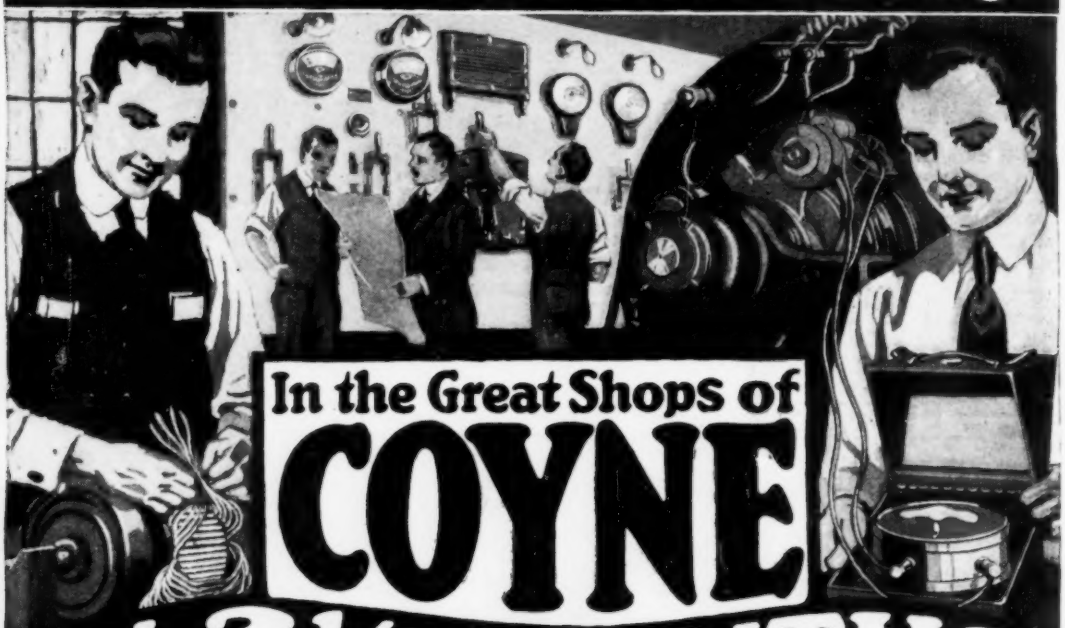

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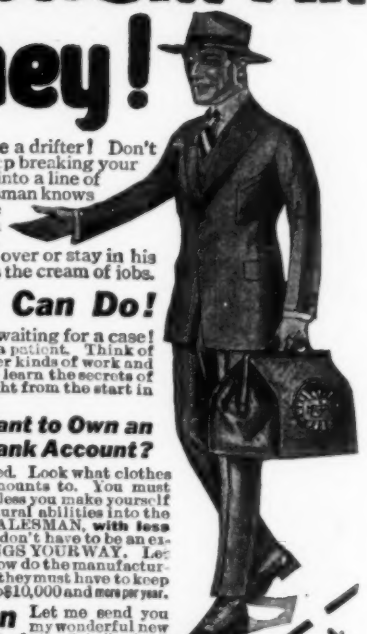

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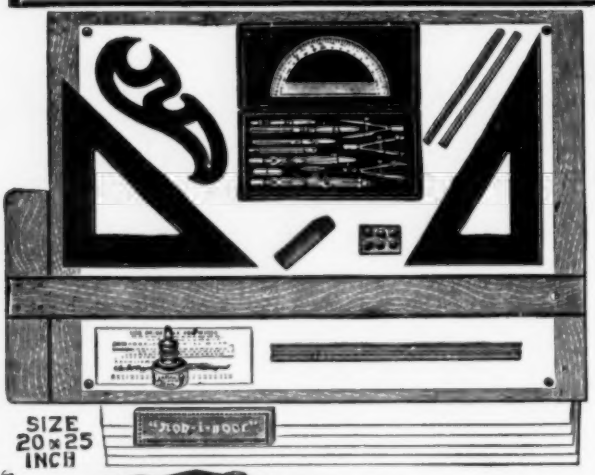

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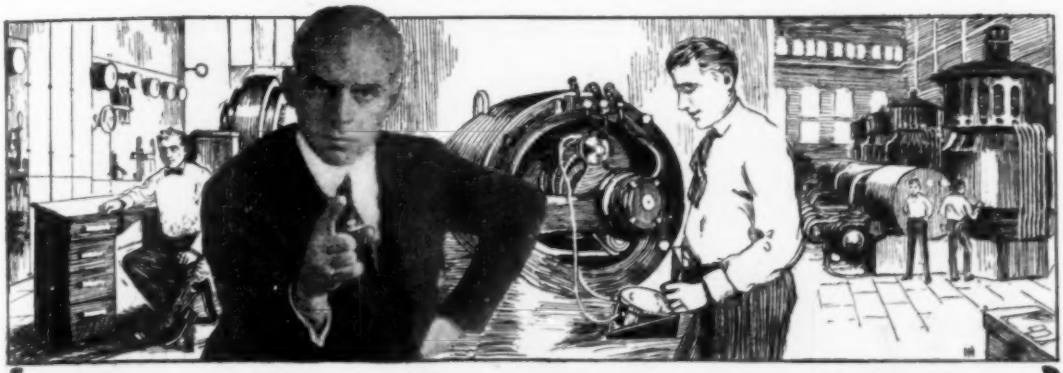

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What are you doing to prepare yourself for a real success? At the rate you are going where will you be in ten years from now? Have you the specialized training that will put you on the road to success? Have you ambition enough to **prepare** for success, and get it? You have the ambition and I will give you the training, so **get busy.** I am offering you **success** and all that goes with it. Will you take it? I'll make you a CERTIFICATED ELECTRICIAN. I am Chief Engineer of the Chicago Engineering Works and can train you better than anybody else. I will instruct and train you, give you my personal advice and help whenever you need it, and assist you in every way to the biggest possible success.

Earn Money While Learning And I'm offering you something you can use **now.** Early in my **Home Study Course** I show you how to begin making money in Electricity, and help you get started. And with my course I am also giving, right now,

FREE BIG ELECTRICAL OUTFIT

A fine outfit of Electrical Tools, Instruments, Materials, etc., absolutely FREE to every student. I will also send you FREE and fully prepaid—Proof Lessons to show you how easily you can learn Electricity and enter this splendid profession by my new, revised and original system of Training by Mail.

Another Big Advantage We have large splendidly equipped Electrical Shops where you can come at any time for special instruction without charge. No other correspondence school can give you this.

And Still More In addition to all this I am giving right now, absolutely **free** to every student who answers this ad, a **big, truly valuable surprise,** that I cannot explain here. Tear out this ad as a reminder, and write me today!

Valuable Book Free My book, "How to Become an Expert Electrician," has started many a man on the way to fortune. I will send a copy, free and prepaid, to every person answering this ad.

Do It Now Good intentions never get you anywhere. It is action, alone, that counts. NOW IS THE TIME TO ACT.

CHIEF ENGINEER COOKE

CHICAGO ENGINEERING WORKS

Dept. 510 Y 441 Cass Street CHICAGO, ILL.

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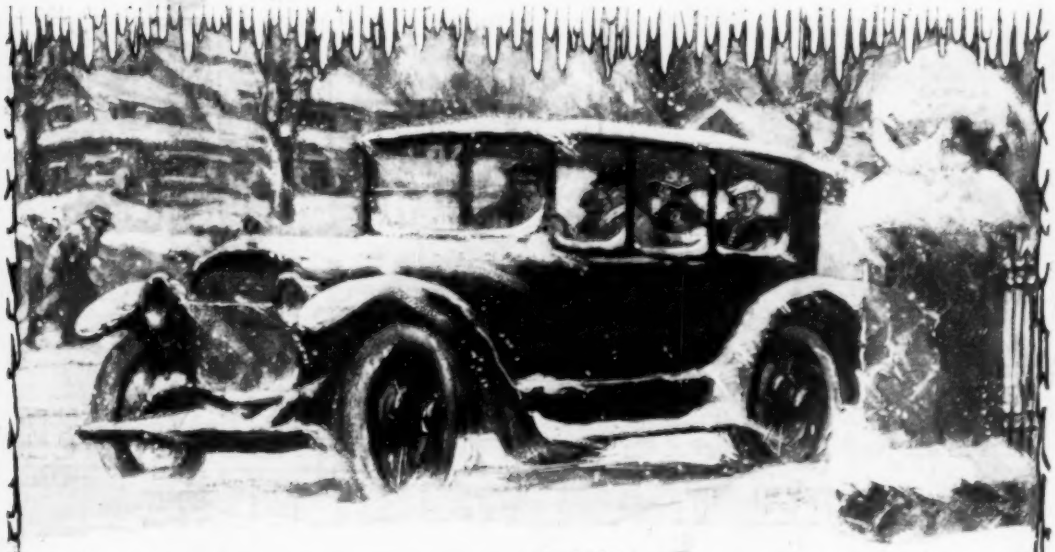
CHICAGO ENGINEERING WORKS
Dept. 510Y, 441 Cass Street
CHICAGO, ILL.

DEAR SIR: You may send me, entirely free and fully prepaid, a copy of your book, "How to Become an Expert Electrician," and particulars about your Home Study Course in Electricity.

Name.....

Address.....

City..... *State*.....



Don't Wait for Weather Like This

DECIDE NOW to protect your car this winter with Johnson's Freeze-Proof. Purchase your supply early from your dealer and read and follow the directions carefully. A little time spent now cleaning the radiator and putting on new hose connections will save you unlimited time, trouble, worry and expense during the winter months.

JOHNSON'S FREEZE-PROOF

is the logical anti-freeze preparation. It is inexpensive—does not evaporate—is non-inflammable—easy to use—and guaranteed. One application will last all winter unless the solution is lost through the overflow pipe or leakage.

Directions Must Be Followed. Johnson's Freeze-Proof will give perfect satisfaction if used according to directions on the label. It requires just a little time and care to comply with these instructions, then your worry is over for the whole winter.

1st—Clean all dirt, scale, sediment, etc., from the cooling system by using a boiling solution of ordinary washing soda. Flush out thoroughly.

2nd—Repair all leaks. Unless hose connections are new, replace them. Tighten all packing and gaskets.

Cost $1.50 per package in U.S.A. East of Rockies. Get it from your Local Dealer

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No Money in Advance
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Let us send you the Oliver for Free Trial. The coupon brings it.

If you agree that it is the finest typewriter, regardless of price, pay for it at the rate of $3 per month. We ask no payment in advance. You have over a year to pay. And you'll have the Oliver all that time. There is no need to wait until you have the full amount.

The free trial does not cost you a penny. For, if after trying the Oliver you wish to return it, we even refund the transportation charges.

Our new plan has been a tremendous success. We are selling more Olivers this way than ever before. Over 700,000 Olivers have been sold! Oliver popularity is increasing daily.

World's Greatest Typewriter Value

For $57 you now obtain the identical Oliver formerly priced at $100. We are able to save you nearly half because of our radically new and economical method of distribution. During the war we learned many lessons. We found that it was unnecessary to have such a vast number of traveling salesmen and so many expensive branch houses throughout the country. We were able to discontinue many other superfluous sales methods. The result—we can afford to sell at $57 the very same Oliver formerly priced at $100.

Over 700,000 Olivers in Use

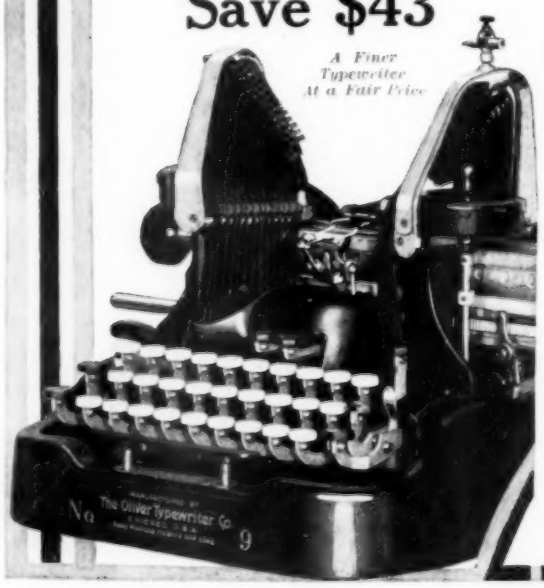
This Oliver is a 20-year development. If any typewriter is worth $100, it is this splendid model. It is the same machine used by great concerns such as United States Steel Corporation, National Cloak & Suit Company, National City Bank of New York, Diamond Match Company, Morris & Company and others of like prominence. And this machine you now get for $57, payable at the easy rate of $3 a month.

Mail the Coupon Now

We can promise you immediate delivery if you act at once. Remember, you need not send any money with the coupon. The coupon alone brings you the Oliver for five days' free trial in your own home. If you decide to keep the typewriter, you can pay for it on terms so easy that you won't miss the money—only $3 a month. If you need to have further information before ordering, fill in the coupon for our free catalog. Check the coupon for free trial Oliver or the catalog just as you wish. Clip the coupon now and mail at once.

Save $43

A Finer Typewriter At a Fair Price



Canadian Price, $72

The Oliver Typewriter Company

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149.03

THE OLIVER TYPEWRITER COMPANY
1099 Oliver Typewriter Building, Chicago, Ill.

☐ Ship me a new Oliver Nine for five days' free inspection. If I keep it, I will pay $57 at the rate of $3 per month. The title to remain in you until fully paid for.

My shipping point is.....

This does not place me under any obligation to buy. If I choose to return the Oliver, I will ship it back at your expense at the end of 5 days.

☐ Do not send a machine until I order it. Mail me your book—"The High Cost of Typewriters—The Reason and the Remedy," your de luxe catalog and further information.

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THIS young footpad has just demanded "Money or your Life Saver." When you are in a hole for something to say, "the candy mint with the hole" will get you out. Life Savers *are* life-savers.

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These happy, snappy, double-o. k. mints travel in the best *circles*. They are always in *good taste*. But, you must make sure to get genuine Life Savers with the hole clear through. This shape dare not be imitated; the flavor cannot be duplicated. Substitutes cost the dealer less. They cost you the same. You can learn the hole truth for a nickel. Put a packet in your pocket.

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